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ON MALT AND MALTING.

By Frank Xavier Moerk, Ph.G.

From an Inaugural Essay.[1]

Malt is described by the Pharmacopœia as "the seed of Hordeum distichum caused to enter the incipient state of germination by artificial means, and dried."

The process which the barley undergoes is termed "malting," and has for its object the production of soluble albuminoids, diastase, from the insoluble albuminous bodies present. These albuminoids possess the property of converting, under suitable circumstances, the starch of the grain into maltose, a fermentable sugar, and dextrin, a body closely related thereto. The formation of diastase proceeds first in the same proportion as the development of the embryo, but after the young plant has arrived at a stage when respiration through the plumula and assimilation through the rootlets can take place, the amount of diastase stored up in the grain gradually decreases. It is, therefore, the aim of the malster to arrest the growth of the germ at the moment when most diastase is accumulated in the grain, *i. e.*, before the future stem surpasses the length of the grain. This is accomplished by killing the embryo by drying and heating.

Malting consists of four operations: Steeping, Couching, Flooring, and Kiln-drying.

I. *Steeping.*—The barley is screened and sifted to remove broken or small grains, it is then let into a large cistern made of stone, iron, cement or wood. The water, temperature 10–13° C. (50–55° F.), is then added and allowed to cover the grain to a depth of 4 or 5 inches. The time required to steep the barley is about three days; the water

[1] Mr. Moerk's thesis, presented to the Philadelphia College of Pharmacy, contains interesting investigations on barley and malt, but being quite voluminous, we deem it best to publish separately the different subdivisions or portions thereof.—Editor.

is occasionally replaced by fresh water, in order to prevent putrefaction of the extracted matter.

II. *Couching.*—The barley, before it is thoroughly saturated, is thrown out of the cistern and put in large heaps on the couch. On thrusting the hand into the heap at the end of 24 hours, the length of time it is allowed to remain there, it does not feel moist. The grain, by this operation, has the benefit of a secondary steep with free access of air, the water adhering to the grain is mostly absorbed. The grain, when saturated, appears soft and flexible, and the husk will easily separate from the body, the latter, on pressing, becomes pulpy. The most characteristic indication of the penetration of the water is the appearance of a longitudinally split grain, the starchy body of which should be smooth and oily looking. The changes taking place while in the steep are as follows: Barley gains from 40 to 50 per cent. in weight and increases about 25 per cent. in bulk. About 1½ per cent. is extracted, of which two-thirds is organic and one-third inorganic matter.

III. *Flooring.*—The barley is now thrown upon the floor to a depth of about 12 inches. The conditions required for a healthy germination are 1, the grain should have absorbed sufficient water while in the steep; 2, the steeped grain should be supplied with plenty fresh air; and 3, a certain, although only slight, amount of heat is required to introduce the activity of life into the grain. The first condition has been complied with in the previous operations. The second is fulfilled by turning the grain so that the portions in the centre and at the bottom are brought toward the top of the heap. This turning is made only once or twice a day for the first few days, but requires to be done oftener after the grain commences to germinate. The third condition is carried out by placing the grain to a considerable depth—12 inches—on the floor; by doing this, heat is generated after a time. The conditions having been complied with, oxygen is rapidly absorbed, and, in combining with part of the substance of the grain to form water and carbon dioxide, heat is generated which stimulates the growth of the young plant, after a time, to such an extent that the rise of the temperature in the mass of the growing grain must be checked. This is done by frequently turning the grain and laying it thinner every time it is turned. At the end of the fifth or sixth day, the grain covers the floor to a depth of 3 or 4 inches, and, as the grain then grows very slowly, it is necessary to stimulate the growth by grad-

ually increasing the depth, so that at the end of this operation, the depth is about 9 inches. Very little change is noticed in the barley until it has been about three days on the floor. On thrusting the hand into the heap at this time, it feels moist. This is called "sweating" by the malster, and here germination commences. The grain is allowed to remain on the floor until the acrospire, plumula, creeping along under the husk *almost* reaches the other end of the grain; if allowed to pass this, the diastase rapidly disappears. This is the best indication of the progress made during flooring, and corresponds with the increase of diastase. The time required for this operation varies from 8 to 12 days. The best temperature is 10–13° C. (50–55° F.); if the temperature exceeds 15° C., it does not take so long a time, but there is a greater loss of substance. This loss, by oxidation, at 10–13° C., amounts to 5 or 6 per cent., whilst with a higher temperature it amounts to as much as 15 per cent. In this operation is produced the diastase, and also a modification of the starch, so that it is readily acted upon by diastase.

IV. *Kiln-drying.*—The further growth of the grain is now stopped by drying it at a temperature varying from 32–71° C. (90–160° F.). It is placed, to a depth of from 6 to 9 inches, on a perforated iron floor and heated air caused to pass through it. A temperature of 32° C. (90° F.) is most approved of to get rid of the greater part of the moisture; 52–57° C. (125–135° F.) for gradually drying the malt; and, 65–71° C. (150–160° F.) to produce an aromatic flavor and reduce the moisture to from 2 to 1½ per cent. By using still higher heats, the variously colored malts are produced. In consequence of the last operation the malt combs, rootlets, become very brittle and are easily removed by sifting.

The loss in malting may be summed up as follows:

In steep	1·5 per cent.
Flooring	5· to 6· per cent.
Rootlets	2·5 to 3· per cent.
Total	9 to 10·5 per cent.

The above description is taken from "Steiner's Principles of Malting," corrected by Mr. T. M. Perot, so as to agree with the preparation of malt at his malt house.

Barley and malt have been the subjects of many analyses; but the results differed in nearly every one. The presence or absence of sugar

and dextrin, one or both, were the points to which these differences were due. Mr. G. Kühnemann, in 1875, was the first chemist to prove that cane-sugar was present in barley and malt, the latter also containing another sugar capable of reducing Fehling's solution. On the other hand, he denied the presence of dextrin, this owing to his belief that dextrin reduced Fehling's solution. Researches made within the last few years, prove that dextrin, if pure, will not reduce the test solution, but commercial dextrin invariably reduces it, owing to the presence of more or less glucose. By repeatedly dissolving dextrin in water, precipitating by and washing with alcohol, glucose can be separated from the dextrin, and the latter will then not reduce Fehling's solution.

MICROSCOPICAL EXAMINATION OF MALT.

By Grace Lee Babb, Ph.G.

From an Inaugural Essay.

The process of malting barley is very simple in theory, but in practice requires a great deal of care, and constant attention. The barley must be carefully selected—this is the work of an expert—and then "steeped." For this purpose it is placed in wooden vats, covered with cold water, and allowed to stand several days. Some maltsters consider this operation complete when the grain is soft enough to be pierced by a needle; others, when it can be crushed between the fingers. The operation is carried too far when the contents of the vats become milky. During this time the barley absorbs from 50 to 60 per cent. of water, which is necessary in the following operations. The unabsorbed water is then drawn off from the vats, and the softened barley is placed in couches upon the floor of the malting house. Germination now begins; the radicles appear, and the acrospires develop; at the same time moisture is given off; hence this stage of the operation is sometimes called the "sweating." Were this allowed to proceed the albumen of the seed would be used for the development of the radicles and plumules, and the desired object—the conversion of the starch into maltose, or sugar—would be lost. To prevent further development the temperature is reduced by spreading out the couches, repeatedly turning, and scattering over a constantly increasing surface. When the process has been carried as far as desired, which is generally considered to be when the acrospire has grown to

two-thirds the length of the grain, it is stopped completely by kiln-drying. This is done in a large room with a brick or tile floor which is heated by steam. Here the barley is finished by being perfectly dried, and this product constitutes the officinal malt.

Much depends upon the temperature used in this last operation; if the heat is sufficient to scorch it, it is ruined as malt, but is used for coloring porter, etc. When the temperature varies from 90° to 100° F., pale malt results; this is the kind required by the Pharmacopœia.

The barley grain is elliptical in shape; its principal part is the farinaceous matter, as the embryo occupies but a small indenture at one end and on the outside. On the opposite side from the embryo, running lengthwise, is a gradually broadening groove. Closely adhering to the endosperm is the pericarp, and outside of this is the so-called husk. Both the pericarp and the husk are smooth and continuous over the embryo, and terminate in the groove.

A transverse section through the barley grain shows the thin-walled parenchyma radiating from the groove, and on the outer edge two or three rows of gluten cells: beyond these are the tabulated cells of the husk, in which is deposited a large amount of silica: between these is seen a brown line of indefinite structure, which forms the pericarp. The gluten cells extend around the grain, but as the pericarp descends into the groove they are obliterated.

The simple theory of malting is that in the presence of moisture absorbed during the steeping operation, and with a certain amount of heat, the diastase which is developed during germination converts the starch into a fermentable sugar called maltose. As the malting process advances, the proportion of starch diminishes, while that of the sugar increases. It was thought that it might be possible to study this change of starch into sugar microscopically, not expecting that the sugar could be distinguished under the microscope, but that the disappearance of the starch granules could be gradually traced, and the indications thus gained would be of practical service by definitely settling the period of time necessary for the transformation of the starch.

With the hope of determining when there was the greatest change in number and appearance of the starch granules, transverse sections of the barley grain have been made, and also of the barley in its different stages of malting, from the steeped down through the series, even including that which had been exposed ten days. The following results have been obtained: The starch granules of the barley vary in

size and shape; some of them are very minute and globular, while others are much larger and have much the same elliptical shape as the barley grain itself. A line which resembles the groove in the barley grain extends the entire length of the starch granule.

The greatest change seems to take place in the minute globular starch granules, as on the tenth day these have to a great extent disappeared, and in some specimens are entirely wanting. On the tenth day there are still found some of the larger elliptical starch granules, and, although their number has decreased, the relative size of the residue has apparently increased. The radiating structure which has already been mentioned as being characteristic of the barley grain is not as distinct in the steeped grain, and can with difficulty be traced in the first day. In these two the starch granules do not appear to be materially changed. In the third day malt the whole structure of the barley grain seems to be expanded; the smaller starch granules become more scattered, and an increase in the size of the elliptical starch granules is noticed. This latter change gradually increases in the fourth, fifth and sixth days' malt, being greatest along the groove, and thence radiating out towards the margin. In the seventh day malt there seems to be the greatest change; the elliptical granules are still observed to be larger, but are now very few in number. The appearance of the eighth and ninth days' malt is not essentially different from that of the seventh day's malt. In the tenth day malt the majority of the grains show a very few elliptical shaped starch granules, and the smaller granules are now replaced by globular masses, the nature of which has not been determined.

In conclusion, the results of the labor spent in this direction indicate that, with sufficient practical experience, the difference between malt which has been subjected to different degrees of exposure upon the floor could be readily detected. It is to be hoped that the subject of the microscopical determination of the value of malt may hereafter be carried out with valuable developments.

Imitation Maple Sugar.—It is said that the flavor of maple syrup may be communicated to cane or glucose syrup by tincture of guaiacum deprived of its resin by precipitation in water. A great deal of the maple sugar and syrup now sold is said to be nearly pure glucose prepared in this way.—*Popular Science News.*

EXAMINATION OF GLYCYRRHIZA EXTRACTS.

By Luther J. Schroeder, Ph.G.

Abstract from an Inaugural Essay.

The author procured eight samples of liquorice, comprising the most prominent brands of foreign manufacture as well as several of American make. The examination was confined to the determination of matter insoluble in cold water, of glycyrrhizin soluble in water and of glycyrrhizin soluble in ammonia. 500 grains of (air-dry?) extract of glycyrrhiza were macerated in 12 fluidounces of cold water for 24 hours, the mixture was transferred to a filter, and the insoluble matter well washed until the filtrate passed colorless, dried (at what temperature?) and weighed. The residue of No. 1 was lightest in color and very smooth; 5 and 6 were somewhat darker and the others were much darker and gritty. The filtrates (diluted to a uniform amount?) likewise varied much in color and taste, those from 1, 5 and 6 being dark colored and of a fine flavor, and the remainder lighter colored and less pleasant; that from 8 had a peculiar acrid taste. These filtrates (without further concentration?) were precipitated with diluted sulphuric acid, the precipitates collected upon a filter, washed with acidulated water, redissolved in ammonia and reprecipitated by sulphuric acid, this operation being repeated several times; the precipitate was finally washed and dried.

The portion insoluble in cold water was treated with diluted ammonia, the filtrate precipitated by diluted acid, and the precipitate purified by redissolving and reprecipitating several times, taking care to frequently filter to take out impurities (?). The results are tabulated as follows, 500 grains being used in each case:

Brand.	Residue.		Glycyrrhizin.		
	Weight.	Per cent.	Soluble.	Insoluble.	Total.
	Grains.				Grains.
1. M. & R.	180	36	38	5	43
2. Y. & S.	174	34·8	30	10	40
3. Dean.	239	47·8	8	5	13
4. Royal.	274	54·8	6	3	9
5. Corigliano	150	30	15	15	30
6. Guzzolini.	132	26·4	10	7	17
7. P. & S.	125	25	10	11	21
8. S. C.	130	26	.....	13	13

REMARKS ON GLYCYRRHIZA EXTRACTS.

BY THE EDITOR.

The results obtained by Mr. Schroeder, as given in the preceding paper, although absolute correctness is not claimed for them, nevertheless appear to possess considerable pharmaceutical interest. Since uncombined glycyrrhizin is sparingly soluble, not entirely insoluble, in cold water and dissolves freely in boiling water, it is evident that the loss of this compound has been the greater the more frequently purification was attempted by re-solution in ammonia and reprecipitation by acid. Sestini in 1878 showed that fresh liquorice root containing 48·7 per cent. of moisture yielded 3·27 per cent. of glycyrrhizin, which is equal to 6·37 per cent. for the dry root. Delondre in 1856 obtained from liquorice root by successive treatment with cold water, boiling water and steam, 15, 7·5 and 16, or a total of 38·5 per cent. of extract, which, if all the glycyrrhizin is present, would contain about 16·5 per cent. of this compound. The largest amount obtained by Mr. Schroeder's process was 8·6 per cent. A portion of this deficiency is due to the water present in the commercial extract, which Madsen ("Am. Jour. Phar.," 1882, p. 7) found to vary between 10·5 and 16·5 per cent.

That different lots of the same brand of liquorice vary to some extent has been repeatedly shown. Mr. Madsen in examining six samples of "Baracco" liquorice (air dry) found the matter insoluble in cold water to vary between 21·1 and 37·5 per cent.; extract soluble in water and reprecipitated by alcohol, 26·65 to 45·60; ash, 6·06 to 14·23; sugar, 7·33 to 15·17, and arabin, 1·52 to 10·49 per cent. Determinations of insoluble matter in liquorice were made by W. N. Martindell ("Am. Jour. Phar.," 1873, p. 151); the fignres obtained by him for 500 grains of commercial extracts, as compared with Mr. Schroeder's results, are as follows:

Corigliano.....218 gr. M., 150 gr. S.;	P. & S.....248 gr. M., 125 gr. S.;
Guzzolini.....175 gr. M., 132 gr. S.;	M. & R.....116 gr. M., 180 gr. S.

The U. S. Pharmacopœia requires that not less than 60 per cent. of the extract should be soluble in cold water. The water naturally present in the extract is obviously included in the soluble matter. The German Pharmacopœia states that 700 parts of the extract, dried at 100°C., must leave a residue weighing at least 83 parts (= not over

17 per cent. of moisture); and when the air dry extract is exhausted with water of not more than 50°C., the insoluble residue, after being dried in the water-bath, should not exceed 25 per cent. Calculated for the dried extract, the limit of insoluble matter is 30 per cent., and the requirement of the U. S. Pharmacopœia should likewise be interpreted as being for the extract dried at 100°C. But if it be conceded that the pharmaceutical and perhaps also the medicinal value of extract of liquorice depends upon the glycyrrhizin, the percentage of soluble matter alone can give no indication of the correct value; and a process for accurately estimating the glycyrrhizin is still unknown.

TASTELESS AND ODORLESS SOLUTION OF AMMONIUM VALERATE.

By R. Rother.

The sharp, unpalatable flavor and repulsive odor of ammonium valerate have not greatly diminished its rather extensive application. This fact certainly indicates that the compound is possessed of some peculiar merit. Now, if by some simple and legitimate means, these objectionable features could be repressed, or favorably modified, a much higher degree of usefulness might be expected. An elixir has thus far been the most agreeable form of administration. But it is scarcely necessary to remark that the powerful and persistent repugnant qualities have yielded to but little if any modification.

It has been customary to exhibit the salt in a slightly alkaline form of solution. Some elixirs of this salt are, however, to be found having a very decided acid reaction. Formerly, when solutions of ammonium valerate were prepared from valeric acid and ammonium carbonate, neutral and slightly alkaline solutions were, as a consequence, more in vogue than now. At present, the elixir is almost exclusively made from the crystallized salt. When these crystals are mixed with water, they form, to a large extent, an oily layer which floats on the surface of the mixture, but subsequently dissolves on the addition of the alcohol. In explanation of this result it was stated that water decomposes the crystallized salt into valeric acid and free ammonia. To obviate this effect the salt was directed to be dissolved in the alcohol first, as then the subsequent admixture of water would not effect its decomposition. The truth, however, is that the crystals are in the main an

acid valerate similar to the acid acetate of ammonium. When the acid valerate is mixed with a moderate amount of water, the normal salt dissolves, whilst the less soluble valeric acid rises to the surface. The addition of a requisite amount of ammonia dissolves the stratum of valeric acid, and thus all the salt is made normal and in permanent solution. Admixture of simple elixir, colored or not, with this solution produces an elixir of the normal valerate uncontaminated by free valeric acid. A solution of the acid valerate fumes in the presence of gaseous ammonia, showing thereby that at ordinary temperatures the valeric acid volatilizes first. From this the writer concluded that the normal salt is not volatile, and that the obnoxious odor is due to the dissipation of free valeric acid. In order to find some expedient which could obviate this change in binding the incipient acid more firmly, a little borax was added to a slightly alkaline elixir of the valerate, colored pretty deeply with simple tincture of cochineal. The immediate effect was a change of the color to a light scarlet, indicating an acid reaction. More borax was then gradually added until this largely predominated, but the new tint remained unaffected. The sharp taste of the elixir had now entirely disappeared, and the repulsive odor was barely perceptible. In consideration of this result, crystallized ammonium valerate was mixed with four times its weight of water, then neutralized with ammonia, and the clear solution treated with borax by gradual addition. The borax was greedily absorbed, but after a certain amount of it had been added, a crystalline precipitate of a new salt began to form abundantly, even during the further incorporation of the borax. On diluting this mixture with twice its volume of water, it became clear immediately. The reaction of the mixture became acid after the first small addition of borax, and retained this condition even in the presence of excess of borax. After one molecule of borax had been consumed by two ms. of the ammonium valerate, the peculiar and unpleasant valeric odor had practically vanished, and the taste of the solution had wholly lost its sharpness and valeric character. It was now pleasantly sweet, with a tinge of saline. By spontaneous evaporation, tolerably large, apparently octahedral, crystals were deposited, but when the solution was condensed by gently warming a different and more confused form of crystals appeared. All these crystals had a very mild saline taste, and yielded ammonia profusely on treatment with potash solution. These results indicate that sodium valerate,

ammonium metaborate and free metaboric acid are formed according to the following equation:

$$2(AmHVa)+Na_2B_4O_7+OH_2=2(NaVa)+2(AmHBO_2)+2(BO_2H).$$

This new form of valerate, aside from its pleasant flavor and odorless character, must also possess superior medicinal qualities. In the first place, the sodium valerate, by retaining the acid more firmly in combination, would seem to aid its absorption and consequent efficiency. In the second place, the ammonium metaborate simultaneously transmits and yields its base in a more prompt and effective manner. In the third place, the boric radicle is itself possessed of just such medicinal qualities as would render it a desirable adjunct. The palatable and acceptable nature of the solution dispenses with the usual adjuvants of the ordinary valerate, and hence the writer proposes a simple aqueous solution in place of the elixir and other forms. This solution, as above already stated, is practically odorless; that is, it is free from the persistent objectionable valeric rankness. This does not imply its being absolutely odorless, however. On drying along the walls of the containing vessel, as also around the mouths of the bottles, a very mild reminder of the former taint adheres, whilst in the body of the solution it cannot be perceived. Receptacles having contained the solution are readily and perfectly cleansed by simply rinsing with water. The older forms of the valerate were characterized by the nearly irremovable nature of the odor. The new solution represents about two grains of the normal ammonium valerate in the fluidrachm, and is prepared as follows:

Ammonium valerate cryst.....119 grains.
Borax .....191 grains.
Water of ammonia.
Distilled water, of each sufficient.

Mix the valerate with one fluidounce of distilled water, and add water of ammonia, drop by drop, until a clear and slightly alkaline solution is produced. Then add two fluidounces of distilled water and the previously powdered borax, and when all has dissolved, excepting a few contaminating crystals of calcium borate, add distilled water to the measure of eight fluidounces, and filter the solution.

THE ASSAY OF CITRATE OF IRON AND QUININE.

By John Chales Falk, Ph.G.

From an Inaugural Essay.

The Pharmacopœia gives a process for assaying this salt which consists in precipitating the quinine with solution of soda from an aqueous solution of the scales, dissolving out the quinine with chloroform, separating the chloroform and evaporating to dryness. The weight of the residue is given as the proportion of quinine in the scales. In order to test the correctness of this process I first prepared some citrate of iron and quinine, carefully following the pharmacopœial proportions and directions, and then assayed it as follows:

Dissolve 4 Gm. of the salt in 30Ccm. of water, pour into the separator, add the rinsings of the capsule and 0·5 Gm. of tartaric acid, solution of soda in excess, then add successive portions of chloroform, and shake several minutes after each addition. Having allowed four portions each of 15Ccm. to run into a weighed beaker it was evaporated on the water-bath till of a constant weight, which was ·560 Gm. A fifth portion of chloroform, evaporated separately, left a residue weighing ·004 Gm. showing that practically all the quinine was removed from the solution. This gave then a total residue weighing ·564 Gm. or ·084 Gm. more than the amount of quinine in the 4 Gm. of scales. On repeating the assay the same result was obtained, and obviously this process was not to be depended upon for accurate results.

This residue was dissolved in a small amount of water with sulphuric acid, filtered and the filter washed with acidulated water till the filtrate ceased to be affected by solution of soda. The filtered solution was then treated with an excess of solution of soda, the precipitate collected on two balanced filters and washed with cold distilled water till the washings ceased to cloud with solution of chloride of barium. The filtrate and washings measured 65Ccm. The filters and contents were dried on the water bath till they ceased to lose weight. The weight of quinine thus obtained was ·477 Gm. equal to 11·925 per cent., and it was almost pure white. The correctness of this result was verified by repeating the assay with the same scales.

Six samples of the salt were procured in Philadelphia and assayed for total alkaloids only, in precisely the same manner.

Sample No. 1 was obtained in the original bottle, and judging from its behavior was made very nearly in accordance with the Pharmacopœia. It contained no ammonia and dissolved slowly in cold water. Chloroform extracted ·557 Gm. of soluble matter, which after being treated as described, weighed ·470 Gm. or 11·25 per cent. of alkaloid. The only noticeable difference between this sample and the U. S. Pharmacopœia preparation was in the straw yellow color of the alkaloid.

No. 2, obtained in the original bottle, was in thin yellowish brown scales, which dissolved quickly in cold water, and on heating with potassa gave off ammonia. Chloroform left a residue of ·493 Gm. which after further treatment weighed ·385 Gm. or 9·625 per cent. This residue had a dark brown color, and was resinous in appearance and fracture.

No. 3 was obtained in bulk from a retail store. It contained ammonia, and in appearance resembled No. 2. The chloroform residue weighed ·515 Gm. and on treating this further yielded the alkaloid similar to that of No. 2 and weighing ·375 Gm. or 9.375 per cent.

No. 4 was also purchased from the shop bottle of a retail store. It contained ammonia, and like the two previous samples was in thin yellowish brown and easily soluble scales. Chloroform removed ·485 Gm. and the final residue weighed ·380 Gm. or 9·5 per cent. The alkaloid was dark brown and resinous.

No. 5, from an original bottle, was in very thin yellowish red, and very easily soluble scales containing ammonia. Chloroform extracted ·508 Gm. and the alkaloid obtained weighed ·410 Gm. or 10·25 per cent. This alkaloid was not as dark colored as Nos. 2, 3 and 4, but was resinous in fracture.

No. 6 was obtained in bulk, and like No. 5 was in very thin scales, and proved to be an ammonio citrate. The chloroformic residue weighed ·511 Gm. and this after the final treatment weighed ·385 Gm. which was 9·625 per cent.; it resembled that of No. 5.

It would appear from these results, that owing to the demand for an easily soluble salt, the manufacturers put chiefly an ammonio citrate on the market, as five out of six of my samples contained ammonia.

The final residue of alkaloids from these five samples were nearly of the same dark appearance, somewhat resembling chinoidin, and due probably to the use of unbleached or amorphous alkaloids in place of the pure, white quinine directed to be used in the Pharmacopœia. Neither of the samples left, on incinerating, an ash of an alkaline re-

action, showing the absence of fixed alkalies. Nor did any of them contain any appreciable amount of cinchonine, as was proven by the ready solubility of the alkaloids in definite weights of ether and alcohol.

Whilst assaying the scales containing ammonia, I noticed that four separations of chloroform of 15Ccm. each were not sufficient in some cases when five and even six such additions were necessary to thoroughly extract the alkaloids. It was also found necessary to increase the amount of tartaric acid to one gram, before precipitating with soda, for when iron is precipitated the clear separation of the chloroform is hindered very much.

SODIO-BISMUTH CITROPYROBORATE.

By R. Rother.

Most of the normal salts of bismuth are either insoluble in water or decomposed by it into insoluble bismuthyl or oxysalts and free acid. Certain bismuth and bismuthyl double salts of various organic acids are extremely soluble in water without decomposition. Alkalies in moderate excess do not disturb these solutions, but most acids destroy the soluble compound and precipitate insoluble normal salts of the organic acids. This behavior is a great obstacle to the formation of permanent acidulated solutions. The generality of galenical preparations of which bismuth is a component usually contain it as ammonio-citrate. The combinations are always permanent when alkaline or if acid when ferrated. All elixirs containing bismuth when in the least acidulated inevitably separate bismuth citrate in crystalline crusts on standing a short time. The peculiar and popular combinations of bismuth and pepsin when acid are sure to precipitate the bismuth salt and when alkaline to injure the pepsin. The writer in attempting to find a suitable compound of bismuth which could bear moderate acidulation and remain dissolved, believed that the sodio-bismuth pyrophosphate would be such a salt, and that it might admit of permanent association with pyrophosphoric acid. No success attending this experiment, the writer next resorted to a trial of various acids in connection with the prevalent bismuth ammonio-citrate. It was found that boric acid did not decompose this salt, and hence a desideratum is thus obtained in the stability of a solution containing free boric acid. This result led the writer to treat bismuth citrate with borax direct, thereby aiming at a similar and definite sodium compound. The

experiment showed that the two salts unite in the proportion of one m. of each. This indicates a secondary double salt constituted thus:

$$\begin{array}{l} Bi - B_4O_7 \\ \| \quad\quad | \\ Ci - Na_2 \end{array}$$

That is a sodio-bismuth citropyroborate. It is a remarkable point in the formation of this salt that the chemically and optically neutral bismuth citrate in combining with the chemically neutral but optically alkaline sodium pyroborate produces a chemically neutral but optically decidedly acid compound. This is a colorless amorphous, very soluble non-deliquescent salt. It is insoluble in alcohol but miscible with water in all large proportions without decomposition. It has a faint saline, slightly metallic but not unpleasant taste. The solution of this salt is not disturbed by the presence of neutral chlorides. Most acids excepting boric acid decompose it at once and precipitate a bulky and gelatinous compound of bismuth and boric acid. This precipitate is insoluble in a moderate excess of acid but dissolves readily in a solution of borax. In the presence of excess of borax no precipitate is formed by the usual acids unless these predominate; citric acid, however, causes a separation of crystalline bismuth citrate.

When the solution of the salt is evaporated to a thin syrupy consistence it becomes slightly turbid on cooling and deposits a large amount of colorless crystals. On spontaneous evaporation the remaining solution yields a considerable quantity of small white crystal. By adding water to the whole residue the colorless crystals rapidly disintegrate and an augmentation of the white crystals occurs. The application of heat in the presence of this small quantity of water does not reproduce the clear solution. But the addition of water in about five times the weight of the residue and subsequent heating promptly effects a clear solution by a reconstitution of the original salt. When, however, the solution of the salt is evaporated at a uniform temperature to a dense syrupy consistence an amorphous beautiful scaled residue remains which resembles in appearance the official ammonia-citrate of bismuth. A small quantity of water again decomposes it into its primary factors, the bismuth citrate and sodium pyroborate. The former appears as white, insoluble crystals, whilst the latter is readily recognized by its taste. It appears therefore that the new salt is a scaled amorphous compound which is permanent in the absence of water and equally permanent in any large proportion of water, but is

readily and completely decomposed by a comparatively small quantity of water. In its production in the solid form some care is necessary, during the later stage of the evaporation, not to let the temperature sink, as this partial cooling in contact with the modicum of water causes a decomposition and consequent turbidity which subsequent heating does not correct.

The following formula yields it with the greatest ease:

Bismuth citrate	399 parts.
Sodium pyroborate, in powder	382 "
Water sufficient.	

Mix the citrate and borax with 2,400 parts of water and apply heat until the citrate is all dissolved. Then filter the solution after having diluted it with its volume of water and evaporate it at a uniform temperature to a dense syrupy consistence and spread it on plates of glass or porcelain so that on cooling the salt may be obtained in scales.

The writer has made no decisive experiments in relation to the action of this salt on solutions of pepsin. When a solution of pepsin prepared with chlorhydric acid is first carefully neutralized with sodium bicarbonate or treated with a slight excess of borax the bismuth solution produces a faint flocculent precipitate, not however proportionate to the amount of pepsin present. The character of the precipitate was not ascertained. Bismuth citrate also forms a soluble combination with sodium pyrophosphate, but the writer has not further examined it.

In conclusion it may be said that when borax is heated with bismuthyl nitrate decomposition ensues, but the resulting compound is insoluble in excess of borax. This shows that a sodio-bismuth pyroborate cannot be formed. Some time since the writer attempted to prepare bismuth salicylate by heating bismuthyl nitrate with sodium salicylate. Perfect decomposition could not be attained, and the writer then heated the nitrate with salicylic acid. A very surprising result followed this experiment. Combination speedily occurred and a readily fusible brown-red crystalline mass was formed. Stronger acids liberated from this a brown-red, peculiarly odorous acid which, without further examination, appeared to be one or more of the three nitro-salicylic acids. This result is in so far remarkable that it easily effects the generation of nitro-acids which ordinarily can only be produced by the direct intervention of very concentrated nitric acid at a high heat.

DETECTION OF CHLORINE, BROMINE, AND IODINE.[1]

By C. Thompson.

In the "Chemical News" (vol. xlviii, p. 296) there appeared a process by Mr. Jones, for detecting chlorine, bromine and iodine in the presence of each other. The process was as follows: "Place a small quantity of the mixture to be tested in a good sized test-tube, add a few pieces of manganese dioxide and then a little water. Add now 1 drop of dilute sulphuric acid (1 part acid to 10 parts of water), a brown tinge indicates the presence of iodine. Boil the mixture and confirm the presence of iodine by the violet vapors in the upper part of the tube. Continue the boiling till these vapors cease to appear, then add another drop of sulphuric acid and boil again until they cease. If necessary, repeat this addition of acid and boiling until violet vapors have entirely ceased. Now add about 2 cubic centimeters of the dilute acid and boil again; brown vapors indicate bromine. Continue the boiling until the vapors no longer smell of bromine, then add another cubic centimeter of dilute acid and boil again. When the vapors no longer smell of bromine, allow the tube to cool thoroughly, add an equal bulk of strong sulphuric acid and warm; a green gas bleaching a piece of moist red blotting-paper at the mouth of the tube indicates chlorine. Occasionally some more bromine comes off on the addition of the strong sulphuric acid, but if so, it is soon got rid of and is succeeded by the chlorine, which is chiefly evolved on heating the mixture. As, moreover, red blotting-paper is far more quickly acted on by chlorine than by bromine there can be no difficulty in distinguishing between the two." Mr. Jones also adds that he has found this process to compare very favorably with others. This process is somewhat similar to that recommended by Vortmann, except that sulphuric acid is the active agent instead of acetic acid. Mr. Barnes has shown that unless very great care is exercised, Vortmann's process is not trustworthy; so that it would not at first sight seem likely that Mr. Jones's process in which sulphuric acid is to be used would answer much better.

Experiments tend to confirm this statement. If there be a large

[1] Report on Analytical Chemistry read before the School of Pharmacy Students' Association.

excess of iodide over that of the bromide present in the solution or mixture to be tested, or if, *vice versâ*, the bromide be in excess, then this result seems to follow in nearly every instance; viz., that the vapor of that halogen which is present in a very small quantity relatively to the quantity present of the other halogen is likely to be overpowered by the vapor of the latter. When relying only on the color of the vapor it was found that when the proportion of the iodine to the bromide was less than 1 to 14, the iodine could not be detected, and even when paper moistened with starch solution was used, there was no indication of iodine if the proportion was less than 1 to 20. As regards detecting bromine, following the process, and relying on the color of the vapor only, it was found that the bromine could not be detected if the proportion between the bromide and iodide present was less than 1 to 15; when filter-paper moistened with iodide of potassium and starch solution was used, it was possible to detect the bromine so long as the proportion between the bromide and the iodide is not less than 1 to 22.

When the chloride is present in small quantities relatively to the iodide and bromide, or more especially if it be the bromide which is in excess, it is not easy to detect it by this method; for when the bromide is in large excess it is not all driven off by the addition of the dilute sulphuric acid, so that when the strong acid is added the remainder comes off and takes along with it the chlorine.

As a rough way of detecting the presence of either one or of all three of the halogens, when present in fair quantity relatively, this process will answer, more especially if the color of the vapor be not alone relied on, but filter paper moistened with starch solution for the iodine and with iodide of potassium and starch solution for the bromine be used.

As a delicate test for detecting the presence of small quantities of either one of the three halogens in presence of the other two it is not to be relied on.—*Phar. Jour. Trans.*, May 3, 1884, p. 881.

Phenic Acid in Yellow Fever.—Dr. de Lacaille, of Rio de Janeiro, professes to have cured thirty-eight consecutive cases of yellow fever by the use of Déclat's preparations of phenic and sulpho-phenic acids, and, in grave cases, the phenate of ammonium. In the early stages he gives the remedies by the mouth, but in the advanced stages the hypodermic method is necessary. He contrasts very favorably his recent experience with his former sad failures without these drugs.—*Méd. and Surg. Rep.*, March 8.

FERRIC ETHYLATE AND COLLOIDAL FERRIC HYDRATE.

By E. Grimaux.

When 1 mol. of ferric chloride in alcoholic solution is mixed with 6 mols. of sodium ethylate, sodium chloride is precipitated, and a deep red-brown limpid liquid is obtained, which is free from chlorine, but contains all the iron in solution as ferric ethylate. The alcohol can be distilled off, and the ferric ethylate is left as a black pasty mass, soluble in absolute alcohol, benzene, chloroform, ether, petroleum, and methyl alcohol. If, however, this residue is heated in a vacuum so as to expel the last traces of the solvent, the small quantity of water present almost completely decomposes the ethylate, and ferric hydroxide separates out. If the operations of filtration, etc., have been conducted in dry air, the ethylate is not completely decomposed. An alcoholic solution of ferric ethylate is not precipitated by a current of dry ammonia, but with dry carbonic anhydride it yields a brown precipitate. Dry hydrogen sulphide reduces it to a ferrous salt, and potassium ferrocyanide precipitates ferric hydroxide.

The action of water varies with the proportion in which it is present. If the alcoholic solution is exposed to a moist atmosphere, or is mixed with a small quantity of water, ferric hydrate is deposited as a jelly. If, however, the alcoholic solution of ferric ethylate is poured into an excess of water, limpid liquids are obtained which have the properties of the solutions of colloïdal ferric hydroxide described by Graham. They coagulate spontaneously after some time, and are coagulated by addition of various substances, such as carbonic anhydride, sulphuric acid, tartaric acid, potassium chloride, sodium chloride, river water, etc. Acetic, nitric, and hydrochloric acids and ammonia have no effect. Hydrogen sulphide produces a black precipitate. The time which elapses before coagulation takes place increases with the dilution of the solution, and is diminished by an increase of temperature. A higher temperature is required to produce coagulation the greater the amount of water present, and a solution of 1 vol. ferric ethylate solution in 15 vols. of water is not coagulated even after four hours' ebullition.

The coagulated ferric hydroxide forms a thick jelly, which always fills the vessel even if the solution is dilute. At first it is transparent, but it gradually contracts with elimination of water. The coagulation of the ferric hydroxide varies with the conditions in the same way as the coagulation of blood, a fact which indicates that inorganic

colloïds are analogous to the nitrogenous colloïds of the animal organism.—*Jour. Chem. Soc.*, May, 1884, p. 573; *Compt. Rend.*, vol. 98.

CARVOL.

By A. Beyer.

Gladstone has shown that the carvol obtained from dill-oil agrees in its principal physical properties with the carvol from caraway oil. Flückiger found that the carvol obtained from German mint-oil, *Mentha crispa*, differed from the carvol from the other two sources in being strongly lævorotatory. The author has re-examined the carvol obtained from these three oils. To obtain it, the crude oils were distilled, the portion of the caraway oil distilling at 223°, those of the German mint-oil at 215 to 230°, and 200 to 215° being employed. The crude dill-oil was used without distillation. The hydrogen sulphide compounds, $(C_{16}H_{14}O)_2,SH_2$, were first obtained in the crystalline state and recrystallized from a mixture of three parts of chloroform and one of alcohol. The yield from caraway oil was 8 per cent., that from dill-oil 40 per cent., whilst the first fraction of the mint-oil yielded 50 per cent., the second fraction 30 per cent. All the hydrogen sulphide compounds melted at 187°. The specific rotatory power $[\alpha]_D$ at 20° of the compound from caraway oil was + 5·53, from dill-oil + 5·44, from mint-oil —5·55. No crystallographic difference in the compounds could be detected. By the action of hydrogen sulphide on an alcoholic solution, all the three compounds were converted into the amorphous thiocarvol $(C_{10}H_{14}S)_2,SH_2$. The carvol obtained from all the hydrogen sulphide compounds agreed in boiling point and density; and the specific rotatory power of carvol from caraway oil and dill-oil was nearly the same, being dextrorotatory; the carvol from mint-oil, however, was lævorotatory ($[\alpha]_D = -62{\cdot}46$ at 2_o).

The carvol from mint-oil was distilled from metaphosphoric acid, the resulting *carvacrol* dissolved in potash solution, filtered, decomposed with sulphuric acid, and the carvacrol, $C_{10}H_{14}O$, was dried over calcium chloride. It solidified at —20° to a crystalline mass. The boiling point was 230 to 231°, sp. gr. at 4° 0·975, specific rotatory power 0. The crystalline barium salt of carvacrolsulphonic acid was also prepared. It was thus shown that the carvacrol from lævorotatory carvol is identical with the carvacrol from dextrorotatory carvol. A small quantity of a hydrocarbon boiling at 168 to 171° was obtained from the mint-oil. It was lævorotatory, and appeared to be a terpene.—*Jour. Chem. Soc.*, March, 1884, p. 331; *Arch. Phar.*, [3] vol. 21.

THAPSIA RESIN.

By F. Canzoneri.

The root of *Thapsia Garganica*, a plant known for its vesicating properties, yields to boiling alcohol a white amorphous waxy substance, slightly soluble in ether and carbon bisulphide, and melting, after purification, at 90°. This substance, however, forms but a small part of the thapsia root. More abundant and important constituents are obtained by treating the dried and chopped root in a percolator with ether, whereby a yellow solution is obtained, which, on distilling off the ether, yields an amber-colored syrupy resin possessing strong vesicating properties. This acid dissolves in strong aqueous potash at ordinary temperatures and in dilute potash when heated—in both cases with great rise of temperature—and on neutralizing the resulting solution with hydrochloric acid, a yellow curdy precipitate is formed, having an unpleasant odor, and consisting of a mixture of liquid and solid ethers and fatty acids, together with resinous substances. From this mixture of products, the author has obtained: (1.) An octoic or caprylic acid, $C_8H_{16}O_2$. (2.) A new acid of the series $C_nH_{2n-2}O_4$, which he designates as thapsic acid. (3.) A non-azotised neutral vesicating substance.

This last constituent was obtained in very small quantity only, and in some preparations was altogether absent; it is moreover very difficult to purify from resinous substances and wax, by which it is generally accompanied. It dissolves in hot alcohol, and separates on cooling in shining needles melting at 87°; also in ether and in carbon bisulphide; all its solutions possess vesicating properties. Heated with strong potash-lye, it dissolves partially and is precipitated in the crystalline state on diluting the solution with water. It is not altered by boiling with strong acids. Heated on platinum foil, it burns away without residue, emitting a pleasant odor.

Thapsic Acid, $C_{16}H_{30}O_4$, is obtained by pressing between paper the curdy precipitate formed on adding hydrochloric acid to the solution of the resin in aqueous potash, and crystallizing it several times from boiling alcohol with addition of animal charcoal. It forms white shining scales melting at 123—124°, nearly insoluble in water, benzene, and carbon bisulphide, soluble in alcohol, less soluble in ether. When strongly heated, it distils without alteration; ignited on platinum foil, it burns with an odor of burnt wax. It is but slowly attacked by

bromine or by strong nitric acid. It is a bibasic acid. Its *potassium salt*, $C_{16}H_{28}O_4K_2$, forms shining anhydrous prisms. The *barium salt*, $C_{16}H_{28}O_4Ba$, obtained by precipitation from the potassium salt, is a white amorphous powder insoluble in water and very slightly soluble in boiling alcohol. The *silver salt*, $C_{16}H_{28}O_4Ag_2$, is a white insoluble precipitate which blackens when heated or exposed to light.

Thapsic acid dissolves at boiling heat in aqueous ammonia, and the solution on cooling deposits a crystalline substance probably consisting of the corresponding amide. The acid heated with aniline at 170—180° in sealed tubes, is converted into the anilide, $C_{16}H_{28}O_2(NHPh)_2$, which forms a white crystalline powder melting at 162—163°, and acquiring a faint violet color when exposed to the air.

The barium salt of thapsic acid distilled at a moderate heat with excess of barium hydroxide, yields a small quantity of hydrocarbons, saturated and non-saturated, having a musky odor, combining for the greater part with bromine, and forming a solid body which when dried between bibulous paper and crystallized from alcohol, forms white needles melting at 73°.

Octoic or Caprylic Acid, $C_8H_{16}O_2$.—On distilling with steam the oily precipitate obtained by neutralizing with hydrochloric acid the potash solution of the ethereal extract of the resin, after removal of potassium thapsate and dilution with water, there passes over a yellow transparent oil, lighter than water. On exhausting this oil with ether, drying the etheric solution with calcium chloride and distilling, the greater part goes over at 220—236°; and on fractioning this portion at intervals of 5—5°, three other fractions are obtained, the most abundant of which is a colorless liquid soluble in alcohol and ether, and solidifying when cooled with snow, in flexible laminæ melting at ordinary temperatures. The product thus obtained is shown by analysis to have the composition of an octoic acid, and in its melting and boiling points it agrees nearly with the octoic acid obtained by saponification of cocoanut oil, and by oxidation of the octyl alcohol from heracleum oil, melting at 16°, boiling at 236—237°, which agreement the author has further confirmed by examination of the sodium, barium, and zinc salts.[1]

The author suggests that thapsic acid may be a *dioctoic acid*, $C_8H_{15}O_2.C_8H_{15}O_2 = 2C_8H_{16}O_4 - H_2$, formed from the octoic acid by slow oxidation in the body of the plant.—*Gazetta*, 13, 514–521; *Jour. Chem. Soc.*, April, 1884, p. 460.

[1] The octyl alcohol of heracleum oil is an iso-alcohol, $CHMe_2(CH_2)_4.CH_2OH$, and consequently the acid obtained from it by oxidation must be an iso-acid, $CHMe_2(CH_2)_4.COOH$. (See Watts' *Dictionary of Chemistry*, 8, 379.) —H. W.

RED RESINS KNOWN AS DRAGON'S BLOOD.

By J. J. Dobbie and G. G. Henderson.

Besides the red resins from *Pterocarpus Draco* and *Croton Draco*, there are three different recognized kinds of dragon's blood, one from the East Indies, *Calamus Draco;* one from Socotra, and one from the Canary Islands, *Dracœna Draco*. The first of these is the only one that has been fully described, but the results are not concordant; this is due apparently to the researches having been carried out on different substances. The authors have now investigated this subject, and have examined several varieties of the so-called dragon's blood, which they find can be arranged in four distinct groups: 1. Those which dissolve completely in chloroform, carbon bisulphide, and benzene; 2. Those soluble in chloroform, but insoluble in carbon bisulphide and benzene; 3. Those soluble in chloroform and benzene, and partly in carbon bisulphide; and 4. Those which are insoluble in all three reagents. The accuracy of this classification is supported by the physical properties of the resins and their behavior towards reagents, and it is evident, therefore, that there were four different kinds of resins under examination. All the resins dissolve to a small extent in boiling water, those of Class 4 being rather more soluble than the others; they are all freely soluble in alcohol, ether, oil of cloves, and glacial acetic acid, leaving a variable amount of insoluble matter, which usually consists of vegetable tissue, sand, etc. They are all slightly soluble also in hydrochloric acid, those of Class 2 being the most soluble; ammonia reprecipitates them from this solution. The aqueous and alcoholic solutions have an acid reaction. When treated with sodium hydroxide, the resins effervesce and emit an odor like that of rhubarb. Ammonia forms a clear mixture with the alcoholic solutions. The resins were carefully purified by means of ether, and then powdered; the results of the individual class examinations may be thus summed up: Resin, 1, brick-red, melting at about 80°, when decomposed by heat gives off very irritating red fumes. It dissolves readily with an orange-red color in alcohol, ether, chloroform, carbon bisulphide, and benzene, but with difficulty in boiling caustic soda, ammonia, sodium carbonate, and with great difficulty in lime-water, whilst, in the cold, it is scarcely soluble in the first two and insoluble in the last two of the latter reagents. The ammonia solution is reddish-yellow, and a portion of the resin is not dissolved. The alcoholic solution gives a brown-red precipitate

with lead acetate. Analysis (combustion and lead estimation) suggests the formula $C_{18}H_{18}O_4$. This variety is derived from *Calamus Draco*. Resin 2, $C_{17}H_{19}O_5$, origin uncertain, is carmine-red, melting at about 100°; when heated it gives off non-irritating fumes. It dissolves freely in alcohol, ether, and chloroform with a pink color, and in cold caustic soda, ammonia, sodium carbonate, and lime-water with purple color changing to orange-red or yellow on boiling, whilst it is insoluble in carbon bisulphide and benzene. The alcoholic solution gives a lilac-colored precipitate with lead acetate. Resin 3, $C_{18}H_{18}O_4$, from *Dracœna*, is vermilion, melting at about 80°; when heated it evolves aromatic irritating red fumes. It dissolves with a blood-red color in alcohol and ether, and in cold caustic soda, ammonia, lime-water, and sodium carbonate, but is insoluble in chloroform, carbon bisulphide, and benzene. Its alcoholic solution gives a mauve-colored precipitate with lead acetate. Resin 4, is a mixture of a reddish-brown resin, freely soluble in carbon bisulphide, and a light brick-red resin, nearly insoluble in that menstruum. The two portions differ considerably with regard to their solubility in ether, benzene, and other reagents, the dark portion being the less soluble of the two. Cinnamic acid was detected in the first and third varieties but not in the others. Johnstone found two resins in one kind of dragon's blood, to the one he gave the formula, $C_{20}H_{24}O_4$, and to the other, $C_{20}H_{21}O_4$.—*Phar. Jour. and Trans.* [3], 14, 361–364; *Jour. Chem. Soc.*, April, 1884, p. 462.

NOTE ON A SAMPLE OF SOPHISTICATED SAFFRON.

By J. Hart, Ph.C.

A few days ago my attention was drawn to a yellow powder at the bottom of a shop bottle containing saffron (*Crocus sativus*). The abundance of the powder (in proportion to the small quantity of saffron), together with its weight, induced me to make a thorough examination of it, and as I have not met with similar results (possibly owing to the want of indices and of more time to search the literature), the following remarks may be of interest:

For the purpose of comparison, 10 grains of a very fine sample of saffron, recently purchased, were incinerated in a platinum crucible; the ash obtained weighed ·5 grain, equaling 5 per cent. The process was repeated with an exactly similar result. This corresponds with "Pharmacographia," which gives "5 to 6 per cent." as the ash of

genuine saffron. Ten grains were then placed under a bell jar and allowed to dry until the weight became constant. The loss was found to be ·25 grain, thus bringing up the ash of a thoroughly dry specimen to 5·12 per cent.

The suspected saffron was very dry; but there was nothing in the color to indicate the presence of mineral matter. There was no perceptible effervescence on the addition of dilute HCl, either in the powder or the saffron, proving absence of $CaCO_3$. Ten grains of the saffron, freed as much as possible from powder by shaking and rubbing, yielded 2 grains, equaling 20 per cent. of ash, showing 14·88 per cent. of adulteration, even after being freed from all loose powder, when compared with a dry specimen of pure saffron. Ten grains of the loose powder (containing a small quantity of saffron) were then incinerated and yielded 0·5 grains of ash, the bulk of which was insoluble in boiling HNO_3, and gave the characteristic flame of barium. An attempt to ascertain the exact nature of the ash from a further 10 grains of powder was frustrated by an unfortunate accident resulting in the loss of the whole. The remaining saffron and powder were then incinerated and the ash analyzed with results as given below. This ash of course contains a proportion of normal ash, but the source of adulteration is proved beyond doubt.

Constituents of ash expressed as parts per 100:

$BaSO_4$	64·28
$CaSO_4$	14·57
Al_2O_3, with trace of Fe	10·71
Salts of K and Na	9·28
	98·84

Remarks.—It is of course impossible to accurately estimate the amount of adulteration, but I think it may be safely set down at from 25 to 30 per cent. I regret that I did not first make a microscopical examination, for although a large quantity of the powder must have fallen off, still sufficient was left on to have been indicated by the microscope. Both these samples were from houses of the highest standing, and in each case the top market price was paid, the adulterated specimen costing 50*s.* a few months ago, and the pure 48*s.* per pound in January last. Another proof is thus afforded, that neither the price paid nor the reputation of the wholesale house is at all times a sufficient guarantee of genuineness.—*Phar. Jour. and Trans.*, March 15, 1884, p. 738.

CASCARA AMARGA—HONDURAS BARK.

By F. A. Thompson, Ph.C., Detroit, Michigan.

Cascara Amarga, also known as Honduras Bark, is obtained from a tree indigenous to Mexico. A description of this tree I am unable to furnish. Specimens of this bark have been submitted to Dr. Vasey of the Department of Agriculture at Washington, for examination, resulting in the opinion that it belonged to the genus Picramnia (from *picros*, bitter, and *thamnos*, shrub), which numbers no less than twenty species. Dr. Vasey having only two varieties in his possession he was unable to determine the exact variety. Picramnia is said by different botanists to belong to the natural order Anacardiaceæ.

The bark as seen in commerce, is mostly deprived of its outer bark which is from one to three millimeters thick, of a brownish-gray color, striated, and much divided by numerous longitudinal fissures. After being immersed in water, it assumes a greenish-yellow tint. The inner bark is of a deep-brown color, three or four millimeters thick, hard, and firm, of a bitter taste, and on examination of a transverse section numerous white spots are to be seen, which appear to be filled with a white insoluble inert substance.

Microscopical Examination:—The outer or cork bark (*a*) is composed of twenty-five or thirty rows of regular thick-walled cells, filled with red coloring matter. The middle bark is composed of large, irregular parenchyma cells (*d*) making up the greater share of the whole bark. Throughout this portion of the bark are numerous sclerenchyma cells (*b*) arranged in groups and also one to three rows are always found close to the outer bark. These sclerenchyma cells make a prominent marking, as seen with naked eye, in cross-section fig. 2. Also at intervals, are one to three ranked series of sclerenchymatous fibres or bast-fibres (*c*) arranged tangentially, which turn brown after treatment with iodine. The inner bark does not differ very much from the middle except it is divided by several rows of medullary rays (*e*) composed of regular cells.

Chemical Examination:—A portion of drug dried at 110° C until constant weight, was found to lose 10 per cent. as moisture. Another portion was incinerated, leaving a white ash amounting to 4·55 per cent.

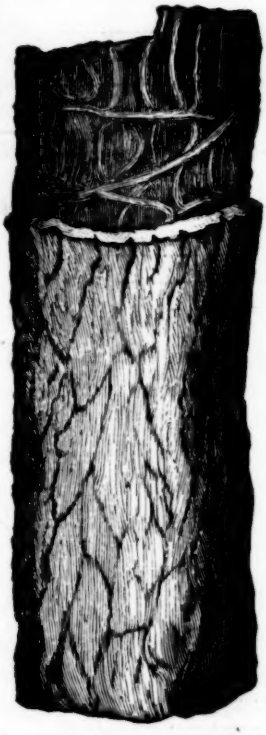

FIG. 1.—Cascara amarga, showing inner and outer surface; natural size.

FIG. 2.—Cross-section, magnified 5 times.

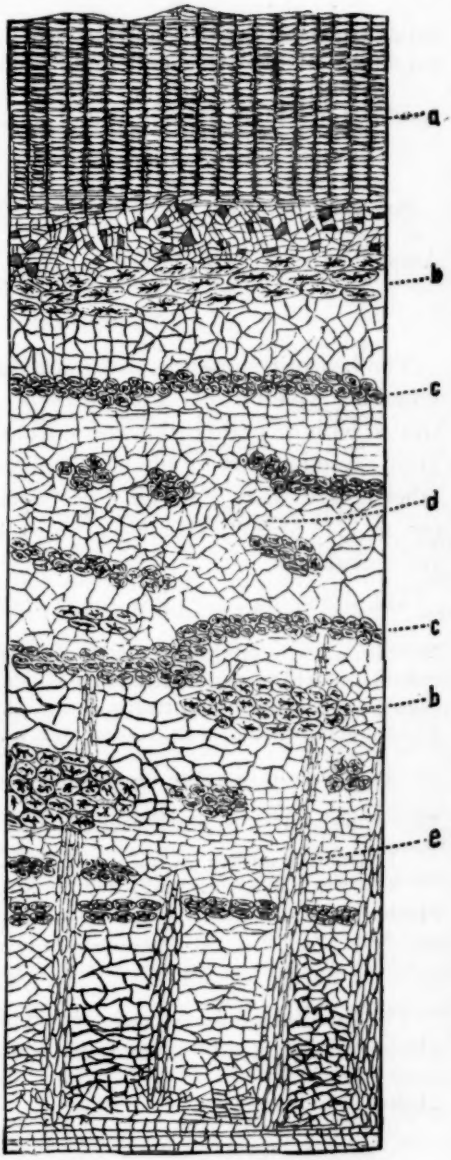

FIG. 3.—Transverse section magnified 75 diameters. *a*, outer bark or cork; *b*, sclerenchyma cells; *c*, sclerenchymatous or bast fibres; *d*, parenchyma cells; *e*, medullary rays.

Soluble in water: K, Na, sulphate, carbonate	1·10
Soluble in dilute hydrochloric acid; Aluminum, iron, phosphates and carbonates	2·89
Insoluble in sodium hydrate; sand	·56
Total	4·55

Several portions of drug were treated with benzol, alcohol and water:

Amount extracted with benzol	2·72 per ct.
" " " alcohol (·889 at 60°)	10·00 "
" " " cold water	4·16 "

The benzol residue was dried at a low temperature, that at 110° C. removing volatile oils and traces of moisture. This residue was treated with several portions of warmed acidulated water, this solution giving reactions for an alkaloid, with tannic acid, Mayer's reagent and other test-reagents. Residue was treated with eighty per cent. alcohol (sp. gr. 848 at 60°) dissolving resins leaving a residue of fixed oils, resins and wax.

The following table gives the systematic course of analysis:

Benzol extract contains: Volatile oils driven off at 110° C.	·50 per ct.
Soluble in acid water, reactions for alkaloids	·22 "
Soluble in alcohol (·848), resins	·40 "
Insoluble in alcohol, wax, resins, etc	1·06 "
Total	2·72 "

Eighty per cent. alcohol extract contains:

Extractive matter	12·65 per ct.
Inorganic ash	·4 "
Matter soluble in water	9·00 "
Ash " " "	·50 "
Matter sparingly soluble, amorphous	·55 "

The dried alcoholic extract treated with several portions of absolute alcohol (·7938 at 60°) evaporated to a dry extract contains:

Matter soluble in water, including		6·34 per ct.
Tannin, organic acids, some extractives precipitated with lead sub-acetate	1·66 per ct.	
Lead removed from solution with H_2S filtrate gave reactions for alkaloid with test reagents.	4·68 "	
Insoluble in water		1·25 "
Soluble in dilute ammonia hydrate, acid resins.	·41 "	
Insoluble in ammonia hydrate, neutral resins.	·84 "	

Matter insoluble in absolute alcohol contains:

Soluble in water, including			3·55	"
Colors, some extractives precipitated with lead sub-acetate	2·01	"		
Matter not precipitated with lead sub-acetate, freed from lead with H_2S gave reaction for alkaloid and trace of glucoside	1·54	"		
Matter insoluble in water; containing			1·31	"
Soluble in acidulated water, reactions for alkaloids	·27	"		
Insoluble in acid water, resins, extractives	1·04	"		
Total extract			12·65	"

Remaining drug was treated with cold water, yielding 4·16 per cent. extract; then with hot water containing sulphuric acid, changing starch into glucose, which was approximately estimated with a standard Fehling solution, showing 1·94 per cent. calculated as starch.

A portion of drug was treated by the U. S. P. process for cinchona assay. The alkaloid solution after neutralizing with sodium hydrate was shaken out with several portions of a mixture of chloroform and ether, and allowed to evaporate at a moderate temperature, yielding 3 per cent. of brownish-yellow amorphous alkaloid, which has a sweetish taste at first, afterward becoming bitter. This alkaloid was treated with dilute sulphuric acid, hydrochloric, tartaric and others, but was unable to obtain crystals from any of the salts. Salts of this alkaloid are freely soluble in water, insoluble in ether or chloroform, are amorphous, forming a white powder when pulverized. Treated with strong sulphuric or nitric acid was unable to notice any colored reactions.

Several pounds of drug were treated with lime water, dried and exhausted with hot alcohol, which on cooling deposited a white amorphous substance, which was treated several times with hot alcohol and allowed to separate out on cooling as a white, crystallizable, tasteless substance, having a low fusing point, freely soluble in chloroform, less soluble in ether and benzin; insoluble in dilute acids and fixed alkalies, and when fused on platinum-foil developes a strong fat-like odor, reminding one of the odor of the fats when fused. A small portion allowed to crystallize from hot alcohol, deposited white, acicular-shaped crystals.

The alkaloid, obtained in different ways, I would suggest to name, Picramnine.

To ascertain the exact nature of this alkaloid remains for a future study which I hope I may be able to give to it. The alkaloid seems to have the peculiar taste found in the bark on chewing a portion, and I think the virtue of the drug will be partly if not entirely represented by the alkaloid. Samples of Picramnine alkaloid are being submitted to the medical profession, hoping to receive soon some information as to its properties —*Ther. Gazette*, Jan., 1884.

Laboratory of Parke, Davis & Co., December, 1883.

MORPHINE.

By O. Hesse.

The author has studied the action of acetic and propionic anhydrides on morphine and its derivatives. With regard to the nomenclature introduced by Grimaux, the author contends that the term codeïne is unjustifiable. When the hydroxylic hydrogen in morphine is replaced by the acetyl group, the resulting product is mono- (or di-) *acetylmorphine;* and when it is similarly replaced by methyl, etc., the resulting compounds should be called *methylmorphine*, etc., and not codeïne, codethyline, etc. For derivatives where one of the hydrogen-atoms of the nucleus is replaced by methyl, etc., the author proposes the name of *morphimethine*, etc.

Morphine dissolves easily in excess of acetic anhydride at 85°, to form *diacetylmorphine*. This substance crystallizes in anhydrous prisms, which are easily soluble in alcohol, sparingly so in ether, melt at 169°, and with hydrochloric acid yield a hydrochloride which gives no coloration with ferric chloride. No more highly acetylized body could be obtained. *Dipropionylmorphine* was prepared in a similar manner. It is amorphous, easily soluble in alcohol, ether, and chloroform, sparingly so in water. The *hydrochloride* is an amorphous powder easily soluble in water and yielding a pale yellow amorphous *platinochloride*, $[C_{17}H_{17}(C_3H_5O)_2NO_3]_2,H_2PtCl_6$. Morphine methiodide treated with freshly precipitated silver chloride yields *morphine methochloride*, crystallizing in long colorless needles, containing $2H_2O$, which it loses at 120°. It dissolves in concentrated sulphuric acid without discoloration, but the solution turns violet when heated. It gives a dark blue coloration with ferric chloride in aqueous solution. The *platinochloride* forms orange needles containing 1 mol. H_2O. Morphine methiodide dissolves with difficulty in acetic anhydride at 100–120°, and forms

the diacetyl compound. The yield is, however, very bad, a much more satisfactory result being obtained with morphine methochloride. *Diacetylmorphine methochloride* crystallizes in concentrically grouped needles, which are easily soluble in water, and give no coloration with ferric chloride. From its solutions potassium iodide precipitates *diacetylmorphine methiodide*. The chloride yields a pale yellow *platinochloride* crystallizing in small needles containing 1 mol. H_2O, which they partly lose on exposure to the air, completely at 110°. The action of methyl iodide on morphine in the presence of bases has already been studied by Grimaux ("Am. Jour. Phar.," 1881, 619). With acetic anhydride codeïne (methylmorphine) gives *acetylcodeïne* crystallizing from ether in prisms which melt at 133°. When propionic is substituted for acetic anhydride, *propionylcodeïne* (*propionylmethylmorphine*) is formed; on evaporating its ethereal solution, this is left as a colorless film easily soluble in ether, benzene, and alcohol. It dissolves in sulphuric acid with a bluish tint, which turns dark blue on the addition of a trace of ferric chloride. When heated, both solutions turn dark green. It yields crystallizable salts with acids. The *hydrochloride* crystallizes in large colorless needles containing $2H_2O$, and soluble in water and alcohol; it gives a yellow crystalline *platinochloride*. The *acetate* crystallizes in colorless needles soluble in water. It loses a part of its acetic acid at 100°. The *hydriodide* crystallizing with 1 mol. H_2O, the *oxalate* with $3H_2O$, and the sulphate are all soluble in water. *Codeïne methochloride* (*methylmorphine methochloride*) is obtained from codeïne methiodide by treatment with silver chloride; and crystallizes in large rhombic prisms with 1 mol. H_2O. It yields a yellow flocculent *platinochloride* with $3H_2O$. The *sulphate* gives colorless needles containing $4H_2O$. A solution of the last-named salt yields, with barium hydroxide, a colorless solution of *codeïne methylhydroxide*, which on evaporation over sulphuric acid, deposits crystals of *methocodeïne* (*methylmorphimethine*). The unchanged hydroxide solution precipitates hydrates from solutions of metallic salts, and rapidly absorbs carbonic anhydride from the air. Codeïne methiodide dissolves in acetic anhydride at 85°, and deposits oblong rectangular tables of *acetylcodeïne methiodide* on cooling. Thus obtained, the crystals are anhydrous; but on recrystallization from alcohol, colorless needles containing $4H_2O$ are obtained. The *platinochloride* forms a yellow crystalline precipitate. If a solution of sodium, potassium, ammonium, barium, or calcium hydroxide be added to an aqueous solution of

codeïne methiodide, a colorless strongly alkaline solution is obtained, which gradually becomes colored, and deposits *methocodeïne.* The reaction is quickened by using an excess of the alkali and heating to boiling. The action of the alkalis is therefore to liberate the hydroxide from which the elements of water are subsequently eliminated,

$$C_{18}H_{21}NO_3,CH_3(OH) = C_{19}H_{23}NO_3 + H_2O.$$

For the preparation on a large scale, it is best to boil the methiodide with rather more than the molecular weight of potassium hydroxide, extract the hot solution with benzene, and shake out the base with acetic acid. The acetic solution is then saturated with sodium chloride, and the precipitated chloride recrystallized from a small quantity of water. A concentrated aqueous solution of the chloride is then decomposed with sodium hydroxide, and the base at once extracted with ether. In a few minutes the ethereal solution deposits long colorless prisms of methocodeïne. Freshly precipitated, this substance dissolves freely in ether, but when crystallized only sparingly. It crystallizes from boiling alcohol in prisms, from boiling water in needles, in the latter case with 1 mol. H_2O. It melts at 118·5°, and dissolved in 97 per cent. alcohol gives $[\alpha]_D = -208{\cdot}6°$ when $p = 4$ and $t = 15°$. In moderately concentrated sulphuric acid, the base and its salts dissolve to a colorless solution, which gradually becomes of a purplish-violet tint, and turns olive-green when heated. The base gives a blue color when heated with concentrated sulphuric acid The *hydrochloride* crystallizes with $2H_2O$ in needles soluble in 10·8 parts of water at 18°. The platinochloride is of a dark green color.

Methocodeïne dissolves in acetic anhydride at 85°, and yields *acetylmethocodeïne.* It melts at 66°, and gives a blue coloration with concentrated sulphuric acid. It is soluble in alcohol, sparingly so in water. The salts crystallize easily; the *hydrochloride* with $\frac{1}{2}H_2O$, the *platinochloride* with $4H_2O$, the nitrate with $3H_2O$, and the sulphate with $8H_2O$.

With methyl iodide methocodeïne forms *α-methocodeïne methiodide,* crystallizing in prisms with $\frac{1}{2}H_2O$ and soluble in water. The *α-methochloride* is obtained from the methiodide by the action of silver chloride, but could not be obtained in a crystalline form. It gives a blue color with concentrated sulphuric acid. The *α-platinochloride* is a yellow flocculent precipitate. *α*-Codeïne methochloride dissolves in acetic anhydride forming *α-acetylcodeïne methochloride,* which crystallizes

with $2\frac{1}{2}H_2O$ in long colorless silky needles, easily soluble in alcohol and boiling water, sparingly so in cold water. It gives up 2 mols. H_2O at 100°, but the remainder cannot be expelled without decomposition setting in. With concentrated sulphuric acid it gives a brownish-red coloration. The *platinochloride* forms a sparingly soluble yellow crystalline precipitate. An aqueous solution of the *α*-iodide becomes milky on addition of potassium or sodium hydroxide, and gradually deposits an oil which appears to be unchanged iodide. If, however, the solution be boiled with alkali, an oil is deposited on cooling, which solidifies after a time. This substance is not the original iodide, but is isomeric with it, and the author therefore names it *β-codeïne methiodide.* It differs from the *α*-iodide in crystalline form, in containing no water of crystallization, and in being less soluble in water. The *β-chloride* was not obtained in the crystalline form, and gave a purplish-violet color with concentrated sulphuric acid. The *β-platinochloride* yields small orange needles: the sulphate is amorphous. Decomposed with barium hydroxide, the sulphate yields the alkaline *β-methocodeïne methylhydroxide,* which crystallizes in small colorless plates and flat prisms, soluble in water and alcohol. If the solution be evaporated at 30–40°, an amorphous deliquescent and highly caustic mass is left. This, however, is not a pure body. The *β-chloride* yields *β-acetyl-methocodeïne methochloride,* from which the *β*-iodide can be obtained by double decomposition. The *platinochloride* forms a yellow powder containing $3H_2O$.

These results confirm the presence of only two hydroxyl groups in morphine; and the author points out that these two groups are different in character, the hydrogen of one being replaceable by either positive or negative radicals, that of the other only by the radicals of the fatty acids. Morphine methiodide is not decomposed by boiling with bases, whereas directly the hydroxylic hydrogen atom is replaced by an alcohol radical, the stability of the methiodide is at once reduced, and in the presence of bases, its decomposition and the introduction of the methyl radical into the nucleus takes place even at ordinary temperatures. The author believes the hydrogen atom thus replaced to be one in close proximity to the hydroxyl group, which is only displaceable by acid radicals, and not, as Gerichten and Schrötter contend, one of those combined with the nitrogen atom. He declines to accept as proved, the formation of methylethylpropylamine by the decomposition of ethocodeïne methylhydroxide, on which Gerichten and Schröt-

ter base their argument. On the latter supposition, the author should have obtained dimethylpropylamine by the decomposition of methocodeïne methylhydroxide, whereas he only obtained trimethylamine. He believes the decomposition to take place according to the equation:

$$C_{18}H_{20}NO_3(CH_3),CH_3OH = N(CH_3)_3 + C_{15}H_{10}O_2 + CH_3OH + CH_2 + 2H_2O.$$

The ethyl compound would then give ethylene in the place of methylene, and this was observed by Gerichten and Schrötter, but ascribed by them to a secondary reaction.

The author is inclined to look upon *laudanine* as a morphine derivative containing propionyl, but in which the relative character and stability of the two hydroxyl groups is different to what is the case in morphine. He is now continuing his researches in that direction.—*Jour. Chem. Soc.*, May, 1884, p. 613, from *Annalen*, vol. 222.

PSEUDOMORPHINE.

By O. Hesse.

In his first communication on this alkaloid, which he obtained from opium, the author stated his belief that it was identical with the oxymorphine of Schützenberger, and that its formula was $C_{17}H_{19}NO_4$. Brockmann and Polstorff (1880) contended that this oxy-morphine had the constitution $(C_{17}H_{18}NO_3)_2$, and based their assumption principally on the fact that nitric oxide was evolved in its production from a solution of morphine hydrochloride and silver nitrite, whereas the formula $C_{17}H_{19}NO_4$ would require an evolution of nitrous oxide. The author now shows that if an aqueous solution of morphine hydrochloride is mixed in molecular proportions with a solution of potassium nitrite, and the whole heated for some time at 60°, crystals of oxymorphine are formed, and a gas evolved which does not turn red in contact with the air, and is consequently not nitric oxide. The formation is evidently due to the decomposition of morphine nitrite, $2C_{17}H_{19}NO_3, HNO_2 = 2C_{17}H_{19}NO_4 + N_2O + H_2O$, and the author points out that an evolution of nitric oxide, when silver nitrite is used, might also be explained by the equation $4C_{17}H_{19}NO_3HNO_3 = 4C_{17}H_{19}NO_4 + N_2 + N_2O_2 + 2H_2O$.

The author now finds that the body $C_{17}H_{19}NO_4$ is a hydrate of the real base, and that the formula for oxymorphine is therefore

$$C_{17}H_{17}NO_3.$$

The hydrate loses its water at 130°, but the base is so very hygroscopic that it is only by taking special precautions that rehydration can be prevented. The less crystalline the specimen in question, the more marked is its hygroscopic character. The alkaloid is best purified by solution in ammonia, from which it crystallizes in colorless crusts containing $1\frac{1}{2}H_2O$, which it loses at 130°. The *hydrochloride* $C_{17}H_{17}NO_3,HCl$, crystallizes in scales containing, under varying conditions, respectively 1, 2, 3, and 4 mols. H_2O. A *basic hydrochloride* $(C_{17}H_{17}NO_3)_2,HCl + 6H_2O$, is obtained in microscopic crystals from a hot neutral acetic solution on the addition of sodium chloride: from a cold solution, the basic salt crystallizes with $8H_2O$. With platinum chloride both the neutral and basic salts yield a yellow flocculent platinochloride $(C_{17}H_{17}NO_3)_2,H_2PtCl_6$.

The *hydriodide*, $C_{17}H_{17}NO_3,HI + H_2O$, loses its water when exposed to the air: the *chromate* $(C_{17}H_{17}NO_3)_2, H_2Cr_2O_7 + 6H_2O$, loses $4H^2O$ at 80°: the sulphate crystallizes with $6H_2O$, and effloresces slightly in dry air, but when crystallized from boiling water it is stable: the *oxalate* yields shining scales, with $8H_2O$: the *acid tartrate*,

$$C_{17}H_{17}NO_3,C_4H_6O_6 + 6H_2O,$$

crystallizes in needles or prisms. Heated for two hours at 120° with acetic anhydride, pseudomorphine yields *diacetylpseudomorphine*, $C_{17}H_{15}(C_2H_3O_2)_2NO_3$. It crystallizes from ether in concentrically grouped flat prisms, containing $4H_2O$, which it loses in the desiccator. It is moderately soluble in ether and chloroform, very soluble in alcohol, in which it yields a strongly alkaline solution. It contracts at 250°, but does not melt until 276°. It gives no coloration with ferric chloride. With hydrochloric acid, it forms a salt crystallizing in quadratic tables. easily soluble in water. With platinum chloride, this salt yields a pale yellow flocculent *platinochloride*,

$$[C_{17}H_{15}(C_2H_3O)_2NO_3]_2,H_2PtCl_6 + 6H_2O.$$

The di-acetyl compound is easily reconverted into the original base by heating it with alcoholic potash. It is clear, therefore, that the hydroxyl-groups of morphine are still present in pseudomorphine. The author was unable to obtain a methyl compound by the action of potassium hydroxide and methyl iodide. He, however, obtained pseudomorphine methyl-hydroxide, $C_{17}H_{17}NO_3MeOH$. The author also believes pseudomorphine to be identical with the substance which

E. L. Meyer ("Berichte" [4], 121) obtained by the action of moderately concentrated sulphuric acid on a nitro-compound which he had obtained by passing a strong current of nitrous anhydride into water in which morphine was suspended.—*Jour. Chem. Soc.*, May, 1884, p. 616; from *Annalen*, vol. 222.

VARIETIES.

ALUMEN USTUM IN INTERMITTENT FEVER.—Schidowski, (*Wratsch*): Burnt alumen has long been known as a febrifuge. S—— does a large country practice, being alone in a district of 70,000 inhabitants, and he had only three pounds of quinine at his disposal for a whole year. He resorted to alum with good results. Two doses of eight grs. each, one to three hours before the recurrence of the fever, effected the object. The powder is given dry and water is drunk copiously after it. He also saw enlargement of the spleen reduced by it.—*Amer. Med. Digest*, May 15.

SULPHIDE OF CALCIUM FOR SCABIES.—Dr. Dolan ("Brit. Medical Journal"), says that sulphide of calcium, known in Poorlaw service as golden lotion, is more effectual in the treatment of itch than conventional sulphur ointment. It may be made by the following formula: Flowers of sulphur, 100 parts; quick-lime, 200 parts; water, 1,000 parts. Boil the whole for some time, stirring occasionally until the substance become incorporated, allowing the liquid to cool, and decant into hermetically sealed bottles. It should not be made in a metal vessel.

It is applied as follows: The patient is first put into a warm bath; he is then painted with a brush dipped in the solution and placed in bed, either in blankets, or a flannel nightgown. After a short time, owing to the deposit of sulphur, the patient's body is almost the color of a guinea. The beneficial effects are speedily manifested; the itching ceases, and, as a rule, in simple cases, after another warm bath, the patient may be discharged cured.—*Amer. Med. Digest*, May 15.

INCOMPATIBILITY OF SULPHATE OF QUININE AND IODIDE OF POTASSIUM.—In a communication to the Biological Society, M. Rabuteau calls attention to the ill effects of iodide of potassium and sulphate of quinine, when administered together or at short intervals. These effects are, on the part of the digestive organs, anorexia, nausea, epigastric pain, colic, and sometimes vomiting; on the part of the general system, *malaise*, slowing and feebleness of the pulse, pallor, and a sense of fatigue. These results are due to the decomposition of the iodide and the liberation of free iodine. This decomposition takes place, not alone in the stomach, but goes on in the intestine also. The same result occurs from the use of an iodide sophisticated with an iodate of potassium. Iodine is set free, and to the action of this is to be referred the local and systemic effects above mentioned.—*Med. News; Lancet and Critic*, March 1.

HOW TO SECURE GOOD DENTAL ORGANS AND PRESERVE THEM FROM DECAY, PREVENT RICKETS, HIP DISEASE, ETC.

By H. E. Dennett, D. D. S., Boston.

It is conceded that dental decay is the dissolving away of lime salts by vitiated secretions. This is not due so much to a want of cleanliness of the mouth as is generally supposed. It is not true that "A clean tooth never decays." One may devote twelve hours out of the twenty-four to the ablution of the mouth and fail to prevent decay of the teeth, so long as Nature's dietic laws are violated. Acid will dissolve lime whenever the two meet. Acid saliva may be expected to follow an excessive use of acids, or of those elements which are capable of being converted into acids, or from a deficiency of the opposite elements.

Perfect health includes a perfect set of teeth. The teeth are little indicators that denote by their condition that of the whole system, just as a thermometer indicates thermal changes.

Stripped of all mystery the rule for health so far as food is concerned is simplicity itself. Nature has given to every one an appetite which, in its normal condition may be relied upon to make a proper choice of foods. Select then, the food for which the appetite calls containing all its natural elements and Nature will take care of the results. Dental development in man is discernable as early as the seventh week of intra-uterine life, hence the importance of a strictly correct diet from the first, if mothers desire to give birth to children who may have perfectly formed. The lime from her teeth will be dissolved, taken into the circulation and appropriated by the offspring. As a consequence, the mother who passes through the periods of gestation and lactation without a sufficient amount of bone and tooth element in her food, will suffer from loss of teeth, neuralgia, rheumatism, and other diseases which result from an impoverished state of a system drained to its utmost. Excepting civilized man all flesh-eating animals take as much of the bone with the flesh they consume as they can break with their teeth sufficiently fine to swallow, and all have good dental organs. Take from any carnivorous animals their supply of bone which Nature furnishes with the flesh and dental decay will be the inevitable result. Several years ago the lions in the Zoological Gardens of London were fed upon the thighs of horses which were too large for them to break and eat. As a consequence their young were born with cleft palates and died. Subsequently they were fed upon deer and other small-boned animals, and their young were born with perfectly formed palates and lived. Veterinary surgeons have long known that certain diseases of their dumb patients can only be successfully treated by feeding them with bone meal. A dam too aristocratic to gnaw bones gave birth to successive litters of rickety pups; but after eating food which contained a liberal supply of bone meal, she produced perfectly healthy ones, and by the same sire. Arguments in favor of eating bone to prevent the decay of the teeth as well as

to cure a long catalogue of bone and kindred diseases might be continued indefinitely; but as "A word to the wise is sufficient," it seems only necessary to add that a long and continued experiment has been made upon a family with most satisfactory results. The bones used were selected from perfectly healthy animals, none being accepted that bore the slightest blemish, carefully cured without being allowed to pass through any perceptible chemical changes, finely granulated and incorporated into soups, gravies, bread, etc., in the proportion of from one to three spoonfuls to each pint of gravy, soup, or flour. The relative proportion of nutritive elements in one hundred parts of different kinds of animal food have been found as follows: beef 26, mutton 29, pork 24, chicken 27, milk 7, bone 51.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, May 22, 1884.

In absence of the president, Mr. Alonzo Robbins was called to the chair, and the minutes of the last pharmaceutical meeting were read and approved.

Professor Trimble exhibited a specimen of *Chinese galls*, their peculiar appearance attracted attention. They are produced by the puncture of an insect named provisionally aphis chinensis, upon the leaf or leaf stalks of the rhus semialata, as stated in the National Dispensatory, and are stated to contain between 70 and 80 per cent. of tannin. Prof. Trimble also exhibited specimens of *extract of quebracho*, both solid and liquid, the former containing about 74 per cent. and the latter 55 per cent. of tannin. This extract is not that obtained from the aspidosperma bark used for medicinal purposes, but by a different plant, Loxopterygium Lorentzii, and is used in the arts for tanning and as a coloring agent.

A very elegantly crystallized specimen of *milk sugar* was exhibited by Prof. Trimble. It was obtained from Messrs. Boericke & Tafel, homœopaths, of this city. Whether it was made in this country, or only recrystallized was not stated. The purity of the article is determined by the quantity of ash; in this case, the result of a number of determinations showed there was only $\frac{2}{100}$ of one per cent.

Dr. F. V. Greene, U. S. N., presented a very white and beautiful specimen of *grape sugar* (solid glucose), prepared by the Glencove Manufacturing Co. (Duryea's) of Long Island.

One of the members thought that a return to the method of notifying the members of the college by means of postal cards would be likely to secure a better attendance.

There being no further business a motion to adjourn was carried.

T. S. WIEGAND, *Registrar.*

HAIR TONIC.—Prof. Gross suggests the following: ℞. Tinct. cantharidis, ʒiss; tinct. capsici. gtt. xx.; glycerini, ʒss; aquæ coloniensis, q. s. ad ℥vj. M. Sig. "Hair Tonic."—*Coll. and Clin. Record.*

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

THE MARYLAND PHARMACEUTICAL ASSOCIATION was welcomed at its annual meeting in Baltimore, May 13th, by Mr. Joseph Roberts, President of the Maryland College of Pharmacy. President Thomson's address, reports of officers and committees and discussions on pharmaceutical matters occupied the time of the Association. The new officers are D. C. Auginbaugh, Hagerstown, President; Steiner Schley, N. J. Corning and L. D. Collier, Vice-Presidents; E. W. Russell, Baltimore, Treasurer; and M. L. Byers, Hagerstown, Secretary.

INDIANA PHARMACEUTICAL ASSOCIATION.—The third annual meeting was held at Evansville, May 13th to 15th. Ex-President G. H. Andrews, occupied the chair. The Association was welcomed by Mayor Bridwell. The President's address and reports of the various officers and committees were read and suitably disposed of. The most important subjects discussed were pill coating, the pharmaceutical uses of starch, errors in prescriptions, the quality of spiritus frumenti, percolation, petroleum ointments, etc. The officers for the ensuing year are: W. L. Johnston, Evansville, President; G. Eliel, T. Gasser and W. H. Ross, Vice-Presidents; Jos. R. Perry, Indianapolis, Secretary; and Emil Martin, Treasurer. On the afternoon of May 15th, the members, with many guests, enjoyed a steamboat excursion on the Ohio river to the mouth of Green river and to Henderson.

NEBRASKA PHARMACEUTICAL ASSOCIATION.—At the annual meeting held in Omaha, May 14th, several practical papers were read and various subjects of trade interest were discussed. The new officers are: Norman A. Kuhn, Omaha, President; J. Z. Cross, H. Cook and J. Reed, Vice-Presidents; H. H. Whittlesey, Crete, Secretary; and C. M. Leighton, Lincoln, Treasurer. The next meeting will again be held in Omaha, on the second Wednesday, 13th day of May, 1885. James Forsyth is Local Secretary.

LOUISIANA PHARMACEUTICAL ASSOCIATION.—The second annual meeting convened at Baton Rouge, on May 19th, President Thibodeaux in the chair. The President's address, reports of officers and committees and a number of papers on different subjects formed part of the proceedings. The officers elected are R. N. Girling, New Orleans, President; A. K. Finlay and J. J. Mellon, Vice-Presidents; Ben. Lewis, New Orleans, Secretary; C. L. Keppler, Corresponding Secretary; and J. B. Lavigne, Treasurer. The Association will hold its next annual meeting in New Orleans, either in April or May, and an invitation was extended to the American Pharmaceutical Association to meet there likewise, when the International Cotton Exposition will be still open.

THE NEW JERSEY PHARMACEUTICAL ASSOCIATION met in Educational Hall, at Asbury Park, May 21st and 22d, President Vandervoort in the chair, and was welcomed by Dr. Mitchell, President of the Board of Health. The time was occupied with the reading of the President's address, of the reports of officers, committees and the Pharmacy Board, and of papers on

chemistry by N. Brant, on pharmaceutical legislation by H. P. Reynolds, and on *syrup of tolu* by G. W. Parisen. The latter paper suggested a process similar to that of the Pharmacopœia of 1870, using hot, in the place of cold, water. Prof. Maisch referred to the various processes in use for making this syrup, and stated that if it was merely intended as a flavoring material, digestion of tolu in water, as directed by the French Codex, would yield a perfectly transparent syrup; the use of magnesium carbonate was objectionable on account of its slight solubility; if, however, it was intended to have the resinous matter also present, a process similar to that for the present syrup of ginger, using an alcoholic solution of tolu, would seem to be preferable to that adopted by the Pharmacopœia.

Interesting experiments on *pepsin* were reported by Mr. Am Ende, who found that some pepsins would but little affect meat fibres, while others acted more energetically, causing the striæ to disappear almost completely. Prof. Maisch asked whether experiments had also been made with the mucous membrane of the stomach, and referred to experiments made by Sellden in 1873, but which appear to be little known here; from these experiments it appeared that maceration with acidulated water extracted only a portion of pepsin, but that by digestion with water an additional and stronger pepsin could be obtained. Pepsin seemed to exist partly in an insoluble or latent condition, which view had more recently been corroborated by several French investigators.

In response to a call, Prof. Maisch stated that he had intended to bring to this meeting, as a subject of general interest, some tubers of the *parent plant of the cultivated potato*, which he had recently received from Mr. H. Bowman, from California; but that they had sprouted to such an extent, that in order to save them, they had to be planted. This plant had been discovered by Prof. Lemmon in Arizona, in the Huachuca Mountains, at an elevation of 9,000 feet, and had been named by Prof. Asa Gray Solanum tuberosum var. boreale. The tubers are quite small, about half an inch or little more in length, and are of two varieties, red and white.

The officers elected are: President, A. P. Brown; Vice Presidents, F. P. Kilmar and R. E. Parsons; Secretary, R. H. Vansant, Ocean Grove; Corresponding Secretary, R. J. Shaw; Treasurer, Wm. Rust, New Brunswick. The next meeting will take place in the city of Camden, on May 20th, 1885.

On the evening of May 21st, the Local Secretary, Mr. Wm. C. Bakes, tendered a reception to the members and guests, at his residence, at Ocean Grove, which was also attended by many residents of the two adjoining towns. On the morning of May 22d a visit was paid to the studio of Mr. Theodore R. Davis, which is located on the beach, and contains many curious and interesting works. After adjournment the park and conservatories of Mr. Hoey, at West End, near Long Branch, were visited.

THE ALUMNI ASSOCIATION OF THE PITTSBURG COLLEGE OF PHARMACY was organized April 29th, and the following officers were elected: President, C. H. Beach; Vice Presidents, J. Wurzell and S. McElroy; Treasurer, A. C. Robertson; Secretary, W. S. Jones; and Corresponding Secretary, D. F. Robinson.

EDITORIAL DEPARTMENT.

PIPMENTHOL.—This name, we think, should be given to the stearopten from the oil of peppermint. The menthol at present in the market is obtained from a Chinese or Japanese volatile oil which Mr. E. M. Holmes has shown to be obtained from one or two varieties of Mentha arvensis (see "Amer. Jour. Phar.," 1883, p. 15). We have now before us specimens of a menthol, prepared by Mr. Albert M. Todd, of Nottawa, St. Josephs co., Michigan, which we are informed is obtained from oil of peppermint prepared in Michigan, and which has not merely a mint-like odor, but has the odor of peppermint. It is in snow-white acicular glossy crystals, and another specimen in delicate white needles forming stellate groups and of a satiny lustre. Even if it should prove to be chemically identical with the menthol as hitherto seen, we believe it to deserve a distinctive name to denote its origin. Mr. Todd informs us that he has succeeded in devising a commercially practical process by which it can be prepared, and we hope to be soon in the position of giving our readers further information concerning its origin and composition.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Handbuch der qualitativen Analyse anorganischer und organischer Substanzen, nebst Anleitung zur volumetrischen Analyse. Bearbeitet für Apotheker und Gerichtschemiker, sowie zum Gebrauche beim Unterricht in chemischen Laboratorien, von Arthur Meyer, Assistent am pharmaceutischen Institute der Universität Strassburg. Mit in den Text eingedruckten Holzschnitten. Berlin: R. Gaertner's Verlagsbuchhandlung, 1884. 8vo, pp. 208.

Handbook of the Qualitative Analysis of Inorganic and Organic Substances, with a guide to volumetric analysis. For apothecaries and forensic chemists, and for use in chemical laboratories.

This work differs very materially from the text-books on analytical chemistry which are generally used, and that it has been written for a special purpose and with the full conception of the means for attaining this purpose, soon becomes evident on examining it. It was not written for the tyro in analytical work, but he who has acquired the requisite proficiency, will find it of very valuable assistance in such investigations as are pointed out on the title page. The reactions are described with sufficient minuteness, but without prolixity, to be readily understood and executed, and those are chiefly considered which serve either for determining the group to which the compounds belong, or for distinguishing them from other similar ones.

The first portion of the work relates to eighteen organic compounds, mostly alkaloids, and employed in medicine. Of these the reactions are given as observed in the isolated state, and next in mixtures, such as naturally occur, or which are often made for medicinal purposes. The quantitative determination of some of the alkaloids is then treated of, and finally their recognition when mixed with other organic matters. Next in order sixteen organic acids are considered, all of these being employed, medi-

cinally or analytically, in the free state or combined. Then follows the systematic course of qualitative analysis in which all the more frequently occurring elements and organic as well as inorganic acids, with their soluble and insoluble constituents are considered; the most important reactions of the inorganic acids; the determination of inorganic and organic poisons; volumetric analysis with special reference to the second edition of the German Pharmacopœia, and finally a table giving the strength of the reagents in use.

The work is well gotten up, the illustrations are very good, and the different kinds of type used readily attract the eye and direct special attention to the various facts, conditions and causes.

Drugs and Medicines of North America. A quarterly devoted to the historical and scientific discussion of the Botany, Pharmacy, Chemistry and Therapeutics of the Medicinal Plants of North America, their constituents, products and sophistication. By J. U. Loyd (commercial history, chemistry and pharmacy) and C. G. Lloyd (Botany and Botanical history) Cincinnati: J. U. and C. G. Lloyd.

The first number of the periodical bearing the above title made its appearance in April. It is a handsome quarto containing thirty-two pages of text, which is printed in clear type upon good paper, and is published at the low price of $1 per year. The long experience and the peculiar facilities of the editors and authors in the procuring and handling of North American drugs, have led us to expect this to become a very valuable and trustworthy publication, and the initial number more than fulfills our expectations. The historical and descriptive portions of the several articles are well written, and the literature has been thoroughly searched, so that but little and nothing of importance has escaped the authors. The illustrations of the plants and their parts are clear and instructive, and the microscopical section of the stem of Clematis virginiana has been artistically rendered.

Judging from this number the plants will be considered in accordance with their botanical relations, which also indicate in many cases close connection in regard to their chemical and medicinal properties, so that the different volumes will constitute a systematically arranged account of those North American plants which have been more or less employed as curative agents. It is one of those works which deserve to be in the hands of every one interested in the subject.

Elements of Modern Chemistry. By Adolphe Wurtz, Senator, member of the Institute, etc. Second American edition. Translated and edited with the approbation of the author, from the fifth French edition, by Wm. H. Greene, M. D., Professor of Chemistry in the Central High School, Philadelphia, etc. With 132 illustrations. London and Philadelphia: J. B. Lippincott & Co., 1884. 8vo, pp. 770. Price $2.50.

We have noticed the first American edition of this valuable work in "Amer. Jour. Phar.," 1879, p. 384, and now on the appearance of the second edition, merely refer to what we then stated more in detail. The size of the book has been increased by eighty-three pages, but this increase alone does not represent the labor bestowed upon it. It has been thoroughly revised so as to embody the progress made in the meantime and still preserve its original character; the metals have been arranged in accordance with the theory of atomicity, and various new chapters have been added,

the principal portion of the additions, as was to be expected, having been made to organic chemistry, in which department many new facts have been elicited of late years.

Shakespeare as a Physician. By J. Portman Chesney, M. D., ex-Secretary Medical Society of the State of Missouri, etc. St. Louis, Chicago, and Atlanta: J. H. Chambers & Co., 1884. 8vo, pp. 226. Price $2.25.

When we first read the title of this work, we were surprised and wondered what new discoveries might have established the fact that the immortal bard had in reality been a practitioner of medicine, and had written his grand works during the leisure hours between visiting his patients. But on turning over the leaves it became apparent, that the collection of his references to any science or specialty of the present day, would be calculated to show the poet in the light of an observer and thinker on subjects in which he was not specially skilled either by education or vocation. Such a collection from Shakespeare's works has been made by the author and arranged in nine chapters, which are entitled obstetrics, psychology, neurology, pharmacologia, etiology, dermatology, organology, chirurgery and miscellaneous. This seems to be quite a formidable array, and it is interesting indeed to have the expressions or dialogues relating to these subjects commented upon in the light of the medical knowledge of the present day; interesting not only to the physician but to intelligent persons generally. Of particular interest to us has been the pharmacological chapter, which contains the remedies and poisons, mentioned or referred to in Shakespeare's works. In our opinion it is futile to base upon the symptoms described in the text of his works, opinions as to the knowledge in those days of nicotine, chloral, chloroform, oxalic acid and other compounds, which chemistry has furnished us in modern times; it is rather to be wondered that the poet's descriptions should accord in so many cases with the observations of modern physiology.

It should be mentioned yet that the author has carefully compared the text of different editions of Shakespeare's works, and has pointed out errors which were introduced by "emendations," but not committed by the poet. It has undoubtedly been a troublesome labor for the anthor to compile, sift and comment upon these particular subjects, but it was evidently a labor of love, which has been laudobly performed.

Sexual Neurasthenia (nervous exhaustion) its hygiene, causes, symptoms and treatment, with a chapter on diet for the nervous. By George M. Beard, A. M., M. D., etc. Edited by A. D. Rockwell, A. M., M. D., etc. New York: E. B. Treat, 1884. Pp. 270. Price $2.00.

This work is published from a posthumous manuscript of the author, arranged and edited by his former associate, Dr. Rockwell. It considers the subject in all its bearings, and dwells fully on the requisite hygienic measures and the medical treatment. Coming from the pen of an eminent writer on a subject upon which he was one of the keenest observers, the book will be duly appreciated by physicians who desire to profit from the extensive experience of the author.

Practical Hints and Formulas for Busy Druggists. Original, contributed, and compiled. By Benjamin Lillard. Vol. I, Part I. New York: J. H. Vail & Co., 1884. 8vo, pp. 80, interleaved. Price $1.

The book contains a large number of formulas and practical hints, many of them contributed by well-known writers. It would be difficult to contrive any sort of system for their arrangement, but a full index facilitates the use. The blank leaves serve for the preservation of additional matter, and blank space is left in the index for recording the additional titles.

New York and Brooklyn Formulary of Unofficinal Preparations. Published by a joint committee of delegates from the College of Pharmacy of New York, the New York German Apothecaries' Society, and the Kings County Pharmaceutical Society.

This is a collection of 81 formulas of so-called elegant preparations, mostly elixirs, but comprising also emulsions, spirits, syrups, etc., for which pharmacopœial formulas were not adopted owing to their ephemeral or questionable value, and which are still more or less prescribed. The three societies mentioned above have done a commendable work in a direction, which in a still broader form we have advocated from time to time for years. This example should be followed by other localities and might well be extended so as to comprise in addition to non-pharmacopœial elegant preparations, intended for taking the place of similar articles manufactured on the large scale, also compounds for domestic remedies, which might be offered and recommended in the place of the numerous secret medicines. The Joint Committee appeal to the medical fraternity to *abstain hereafter from designating the maker's name* of any preparation for which they offer a formula. The little work will be sold at a mere nominal price, to cover the cost of printing it, and may be obtained by addressing the New York College of Pharmacy.

Pharmacopœia Germanica, Editio altera (The German Pharmacopœia. Second edition, which by authority of the Federal Council replaces the first edition on January 1, 1883. Translated by C. L. Lochman. New York: J. H. Vail & Co., 1884. Pp. 295. Philadelphia: D. Phreaner. Price $2.50.

A little over ten years ago we noticed the English translation by M. Lochman of the first German Pharmacopœia, and now we have before us the translation of the second edition, the original of which was noticed in "Amer. Jour. Phar.," 1882, p. 639. It will be remembered that it appeared simultaneously with the new United States Pharmacopœia. Our readers are familiar with the nature and scope of the work, more especially with the Galenical Preparations, the formulas for which we have published and compared with those of the U. S. P. in the Journal for 1883. The volume now before us is a faithful translation, and contains also the English synonyms and in most cases the titles of the corresponding preparations of the U. S. P., which synonyms, however, refer to the names only, but in the large majority of the preparations not to identity in strength. As far as we have examined this work, we have observed only few typographical errors, and one mistake in placing the German name "Aetherische Eisenchloridtinctur" to the tincture preceding Tinctura ferri chlorati aetherea, to which latter it properly belongs.

Étude micrographique et spectroscopique des Teintures et des Alcoolatures et en particulier des Teintures d'Opium. Par H. F. François Gay, Pharmacien de première classe, etc. Montpellier: Boehm et Fils. 1883. Pp. 110.

Micrographic and Spectroscopic Studies of Tinctures and Tinctures of fresh herbs (alcoolatures), and particularly of the tinctures of opium.

This is a thesis, presented to the École supérieur de Pharmacie de Montpellier, on a subject of great importance to the pharmacist, on which investigations were made by H. Deane and H. Brady, W. Gilmour, W. W. Stoddart and others. The preparation of tinctures by different methods is considered, with their composition, preservation and changes to which they are subject under varying conditions, and with their physical and chemical properties, and their optical and micrographic characters. The literature has been well searched and compiled, and a large number of facts observed by the author and by others have been collected. The work is accompanied by five lithographic plates, giving the microscopic appearance of precipitates occurring in tinctures, and of crystals formed by the spontaneous evaporation of various proximate principles, and of tinctures of opium prepared from different material; also a lithographic plate illustrating the spectroscopic investigations.

Le Gelsémium sempervirens au point de vue botanique, chimique, physiologique et thérapeutique. Par Paul Pradel, Pharmacien de première classe, etc. Montpellier: Cristin, Serre et Ricome. 1884. Pp. 40.

Gelsemium sempervirens from the botanical, chemical, physiological and therapeutic standpoint.

This American drug has for some years past attracted more or less attention in Europe; but the investigations to which it has been subjected, have been mainly made by American and English pharmacists and physicians. The latest investigations made by Prof. Wormley and Dr. E. Schwarz ("Amer. Jour. Phar.," 1882, pp. 387 and 389) seem to have escaped the author's notice.

Excerpts from Professor Hugo Schulz's Treatise on Eucalyptus Oil. Translated and supplemented by Baron Sir Ferd. von Mueller, K. C. M. G., etc. Sydney: L. Bruck. Pp. 48.

A reprint from the "Australasian Medical Gazette," treating mainly of the physiological action and therapeutic uses of the drug named.

Essai d'une monographie locale des Conjuguées. Par François Gay, Préparateur à l'Ecole supérieure de Pharmacie. Montpellier: Boehm & Fils. 1884. Pp. 112.

Conjugatæ; a local monograph.

This is a valuable contribution to the literature on minute algaceous plants, belonging to the families Desmidiaceæ, Mesocarpeæ and Zygnemaceæ, which the author has found in the neighborhood of Montpellier. It contains four well executed lithographic plates, each with numerous figures of the plants described.

Société des Pharmaciens de l'Eure. Bulletin No. 10. Compte-rendu des Scéances des 29 Avril et 30 Septembre, 1883. Evreux: E. Quettier. Pp. 86.

Besides the proceedings of the Society and several reports, the pamphlet contains investigations on commercial extracts of cinchona, belladonna, and conium, by Lepage; on the coloring matter of wines, by Pinchon; on the estimation of potassa and soda in mixtures, by Pinchon; and on arsenical compounds, by C. Patrouillard.

New York State Medical Association; founded, February, 1884. Pp. 43.

This pamphlet contains the minutes of a convention held in the city of Albany, February 4 and 6, 1884, at which the New York State Medical Association was organized on a permanent basis by physicians who adhere to the code of ethics of the American Medical Association.

The Recent Advances of Sanitary Science. The Relation of Micro-organisms to Disease. By Henry O. Marcy, A. M., M. D., President of the American Academy of Medicine, etc.

An address, full of interest, delivered before the Academy at its last annual meeting at New York, October 10, 1883.

The Student's Grammar of Latin, for the First Instruction in the Fundamental Rules of Latin, with the Correct Roman or Continental Pronunciation. By A. F. W. Neynaber, Sr., Detroit, Mich.

A little pamphlet of 32 pages, containing the rules for Latin declension and conjugation, with the Latin names for weights and measures, the Pharmacopœial titles of medicines with the genitive case, numerals, and other words used in prescriptions.

Report of the State Board of Pharmacy to the General Assembly of Kentucky, February 25, 1884. Frankfort, Ky.

The Board recommends that the clause of the pharmacy law, permitting the registration of "Graduates in Pharmacy" without examination, be expunged, or if retained that graduates be defined to be those coming from institutions requiring an apprenticeship of at least three years as a condition for graduation. The Board further recommends that the provisions of the law be extended to all towns and cities of the State, and that they not apply to any practitioner of medicine "dispensing the medicines needed in his practice," the last seven words to be added as an amendment.

The Annual Report of the Pharmacy Board of Victoria. Melbourne, 1884.

The Board reports two convictions during the preceding year under the Pharmacy Act of 1876; one person sought to evade the law by styling himself "Botanic" druggist, and a chemist retired from business was practicing medicine and surgery. The qualifications before being eligible for the major examination are: having served for not less than four years as an apprentice in the business of a registered pharmaceutical chemist, or chemist and druggist, or homœopathic chemist, and attended one course of lectures, and passed examinations in each of the following subjects at the University of Melbourne, or some school or college of pharmacy recognized by the Board—Materia medica, medical botany and practical chem-

istry; and passed examinations before the Board in the subject of practical pharmacy.

Twenty-seventh Annual Report of the Council of the Pharmaceutical Society of Victoria, 1884, with List of Members and Hon. Members. Melbourne.

The Sixteenth Annual Report of the Board of Managers of the Philadelphia Orthopædic Hospital and Infirmary for Nervous Diseases (supported by voluntary contribution).

Aneurism of the Femoral Artery, and a Knife-wound of the Intestines. By Professor W. O. Roberts, M. D., Louisville, Ky. Reprint from the "American Practitioner."

Peroxide of Hydrogen in Suppurative Conjunctivitis and Mastoid Abscesses, with a Report of Two Cases. By A. E. Prince, M. D., Jacksonville, Ill. Reprint from "St. Louis Medical and Surgical Journal."

OBITUARY.

JEAN BAPTISTE ANDRE DUMAS died at Cannes April 11th, 1884.—"A savant has been removed from our midst whose labors in science extend over more than half a century, and who stood for a long time at the head of its progressive movement." "The last one of those great chemical researchers has stepped from the scene of life, who served as landmarks, towards which to steer their course, to those who entered the domain of chemistry during the third or fourth decennium." We quote these expressions from the remarks made by Professor A. W. Hofmann, with which he announced the death to the German Chemical Society, and we may add that Dumas was the last one of those illustrious pharmacists who, born near the beginning of the present century, by their indefatigable labors guided science into new channels, and secured for it solid foundations for future generations to build upon. Dumas was born in Alais, Department of Gard, July 14, 1800, studied pharmacy in Geneva, and in 1821 came to Paris, where he spent the remainder of his useful life. Aside from his determinations of the vapor densities of iodine, sulphur, phosphorus, mercury, etc., which became of the utmost importance for theoretical chemistry, his investigations in inorganic chemistry were numerous, but those in organic chemistry were particularly fruitful of lasting results. About 1823 he analyzed in connection with Pelletier a large number of alkaloids; in 1826 he determined with Polydore Boullay the composition of compound ethers; in 1830 to 1835 he discovered oxamid and investigated camphor, many volatile oils and their stearoptens; in 1835, he investigated with Peligot wood spirit and its derivatives; in 1840 with Stas the action of alkalies upon organic compounds; in 1841 the composition of indigo; in 1842 with Piria the compounds of tartaric acid; in 1843 the homologous nature of the fat acids, etc. Dumas also took an active part in determining the combining weights of elements, their replacing one another, the

constitution of compounds, and in other questions of theoretical and also of physiological chemistry, which were fruitful in new discoveries.

Aside from the numerous essays published in journals, he wrote several important works on chemical subjects, of which the eight volumes comprising his Traité de Chimie appliquée aux Arts appeared in 1828 to 1845. He commenced his career as teacher in 1823, when he was appointed tutor (répétiteur) of chemistry in the Polytechnic School, and afterwards held the chairs of chemistry in the Athenæum, in the Sarbonne and other institutions. He was for a number of years a member of the Council of Education, was elected to the Assembly in 1848, held the position of Secretary of Agriculture and Commerce in 1849 to 1851, and was subsequently made a Senator and a member of the Superior Council of Public Instruction.

CHARLES ADOLPHE WURTZ, died Paris, May 12, 1884, having for 30 years occupied the chair of medical chemistry in the Faculty of Medicine of Paris, to which he was elected after Orfila's death, in 1853, and after Dumas's retirement in 1854, the two chairs being then united. Wurtz was born in Strassburg, Alsace, November 26, 1817, studied medicine in his native city, where he graduated in 1843, after having been in charge of the chemical laboratory since 1839, and subsequently taught chemistry in Paris and Versailles until he became connected with the Faculty of Medicine. The investigations of Wurtz, both in inorganic and organic chemistry, are very numerous, and it was more particularly in the latter that his influence has been felt in shaping the theories which are at the present time acknowledged. In 1849 he, simultaneously with A. W. Hofmann, discovered the class of compounds known as substituted or compound ammonias, or amines; in 1855 he showed the analogy of glycerin with alcohol, differing from the latter in being triatomic; in 1856 he discovered glycol and showed it to be a diatomic alcohol; in 1859 he formulated the distinction between basicity and atomicity of acids. Of his separate works, the one best known here is Elements of Modern Chemistry, of which the appearance of a new American edition is noticed on page 346 of this number.

GEORGE ENGELMANN, M. D., died in St. Louis, Mo., February 11, 1884, at the age of 75 years. The deceased was born and educated in Germany, and resided in St. Louis for many years. He was one of the most noted botanists of North America.

SAMUEL D. GROSS, M. D., who stood in the front rank of modern surgeons, died in Philadelphia, May 6, 1884. He was born near Easton, Pa., July 8, 1805, graduated from the Jefferson Medical College in 1828, and, after occupying chairs in medical schools in Cincinnati, Louisville and New York, was elected Professor of Surgery in the Jefferson Medical College in 1856, from which position he retired in 1882. In compliance with directions left by him, his body was cremated at the Lemoyne furnace in Washington county, Pa., and his ashes were taken to Woodland Cemetery, Philadelphia.